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Joint Editors
U. Baliol Scott R. Bruce Dunfield

News Editor A. G. Thomson
Assistant Editor R. Bowran

Display Advertisement Manager
E. S. Hooper

Circulation
Robert Budd

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Canada puts it in Writing

THE mining industry in Canada has expanded very rapidly during the past three decades, and particularly in the last five years. The value of production of the mining, smelting and refining industries in 1955 (not including petroleum, natural gas and coal) amounted to $1,634,000,000 compared with an average gross value of production, in current dollars, of $217,000,000 for the years 1926 - 1930 and $579,000,000 for 1945-49. Having regard to Canada's immense mineral resources and expanding economy, the continued growth of the mining industry seems assured. The Royal Commission on Canada's Economic Prospects estimates that by 1960 the total value of the mine production may be about 3½ times present levels.

The rapid development of the Dominion's mineral resources must result in expanding outlets for the supply of machinery and equipment. The potentialities of this thriving dollar market have been reviewed in this journal from time to time, notably in our issue of March 23, 1956 (pp. 360 and 361), in which emphasis was placed not only on the opportunities but also on marketing problems and the importance of efficient sales and service organization.

With the object of raising the level of U.K. imports, a Canadian Mining Mission visited this country some 18 months ago and discussions were subsequently held in the Dominion between Canadian businessmen and a very strong delegation from Britain, headed by Sir William Rootes, of the Dollar Exports Council. There have since been welcome signs not only of growing interest in the Canadian market on the part of British equipment exporters, but of a more widespread appreciation of the need for market research and efficient selling methods.

Mr. Gordon Booth, a United Kingdom Trade Commissioner in Canada, stated last December that there were nearly 800 U.K. subsidiary plants in the Dominion. He pointed out that the growth of this kind of company—that is, a company with a stake in Canada employing Canadians, and often managed by Canadians—was the most effective answer to critics who contend that Britain does not understand what Canada expects in the way of delivery and service.

"The answer is that these companies are here," said Mr. Booth. "Their products are ready on the shelf and they are backing up their products with good service. In addition to these subsidiary companies, there are many hundreds of other U.K. firms selling into Canada through agents, many of them doing a first-class selling job."

In this connection attention may usefully be drawn to a Buyer's Guide to British products for the Canadian mining industry which has been compiled and produced by the Canadian Association of British Manufacturers and Agencies, Toronto, in co-operation with the United Kingdom Trade Commissioners in Canada. Containing 140 pages, it gives the names of over 300 British suppliers of machinery and equipment, who have sales and servicing facilities in Canada. It is divided into four main sections including complete details of the products, names, addresses and telephone numbers of the subsidiary and associated companies, and representatives of British firms in Canada, and an alphabetical cross index of the British manufacturers concerned.

The guide is being distributed to all managers and purchasing agents of mining operations in Canada, and also to consulting engineers and others, offering technical services to the Canadian mining industry. Copies (price 15s. 6d., including postage) are available from the Dollar Exports Council, 21 Tothill Street, London, S.W.1.

This is the first time that the Canadian mining industry has been specially catered for in this way by overseas suppliers. At present, British manufacturers are supplying only about 5 per cent of Canada's total imports of mining machinery and allied products, but it is hoped that the Buyer's Guide will help in stimulating greater sales of British machinery and equipment.

This co-operative venture is an impressive indication of the vigorous and realistic efforts with which the problems of expanding machinery exports to the Canadian market are currently being approached. At the same time the importance of personal contact is becoming more widely appreciated, as is indicated by the growing number of top executives who are visiting Canada either individually or as members of missions. For instance, a British Engineering Mission to Canadian oilfields and refineries is at present in the Dominion studying the requirements of Canada's rapidly developing petroleum industry on the spot.

Such missions are of inestimable value both in promoting a greater awareness in Canada of the high standards and scope of British equipment and of encouraging firms in this country to accept the challenge of a market which, while highly competitive, offers rich rewards to those who are aware of its particular requirements and conditions.

MINING ACTIVITY IN ISRAEL

Apart from the copper deposits near Timna, the discovery of many other minerals in the Negev has made much progress. Phosphates, glass sand, ball clay, feldspar and gypsum are being exploited commercially. Manganese, mica, bitumen-bearing rock, sulphur and kaolin also occur in the Negev and there are peat deposits near Lake Hula in the northern part of the country. Israel is one of the few countries possessing deposits of the raw materials for the three main types of fertilizers in common use, i.e. phosphates, nitrates and potash.

Phosphate rock is mined at Oron, which is situated to the east of the "Great Crater" in the Negev. Production totalled 85,000 tons in 1955/1956 and is expected to reach about 120,000 tons during 1956/1957.

The government holds from 50 to 100 per cent of the capital in the various surveying, research and exploitation companies and corporations. Amongst the most important of these development organizations are: Israel Mining Industries (copper, manganese, general research); Negev Clay and Fine Sand Ltd.; Negev Phosphates Company Ltd.; Dead Sea Works Ltd. (potash works at Sodom); Dead Sea Bromine Co. Ltd.; Dead Sea Shore Development Corporation; and Fertilizers and Chemicals Ltd. (central offices in Haifa).

The Ministry of Development exercises general supervision over the activities of these companies.

A new field of phosphates has been recently discovered in the central district of the Negev and it is believed that the deposits are of high quality. A group of geologists is now investigating their commercial value.

Marble exports last year totalled about $45,000 and are expected to rise soon to some $500,000 a year. Very extensive marble quarries are located in Galilee, between the towns of Acre and Safed, but also in the Negev, in the Wadi Ramon and near Eilat. Local marble comes in many colours. About 20 marble-polishing mills are at present in operation. A granite cutting and polishing plant has been set up in Eilat and considerable sums are being invested in that plant and in the granite quarries of Eilat.

In 1957 final tests will be carried out upon the invention of the Laboratory Director of Israel Mining Industries. This is an improved process for the chemical reaction of salts and acids, and it is expected to facilitate the exploitation of natural and mineral resources both in Israel and abroad.

Negev Clay and Fine Sand Ltd. are presently supplying 15,000 tons of sand annually to local glass manufacturers. A plant will be completed this year at Dimona, west of Sodom, for washing and sifting sand. It will raise the quality of the sand and enable the glass industry to increase output by 30 to 50 per cent.

An Israeli hydrologist, Dr. Alfred Loehnberg, selected by UNESCO some months ago to provide technical assistance to the government of Mexico, is the first expert of this kind sent abroad from Israel under the international aid programme. He will remain in Mexico for one year.

QUEENSLAND WORTH £100,000,000 A YEAR

A statement has been made by an official of the Department of National Development that in from 15 to 20 years North Queensland mineral resources could be worth £A100,000,000 per year to Australia. New towns and posts could be established on the Gulf of Carpentaria; industrial expansion could take place in remote parts of the country, and Australia's first atomic power station could be established in the north.

The forecast is based on two recent mineral discoveries. Consolidated Zinc Corporation's Weipa bauxite deposit on the west coast of Cape York Peninsula is believed to be the biggest in the world. It is being rapidly developed, and the Queensland Government has sent a ship to the Gulf of Carpentaria to survey for the site of a port, which it is expected may cost up to £A4,000,000. Three points have been selected for survey; Weipa, Pera Head and Port Musgrave. This work is expected to be completed in 12 weeks. Already, the Imperial Chemical Industries of Australia and New Zealand Ltd. is investigating the supply of chemicals to the potential aluminium industry. Aluminium Laboratories, of Canada, has large holdings of bauxite-bearing country in the vicinity of the Consolidated Zinc concession.

The development of Mount Isa Mines' silver-lead-zinc and copper deposits, not only in the existing mines, but also 12 miles north of this centre, is expected to expand into operations some three times the size of present production, or about 13,000 tons of ore per day. In addition, the company has recently discovered a large outcrop of oxidized lead ore on the McArthur River, across the border in the Northern Territory, which appears to be a 10 per cent lead proposition, based on prospecting work to a depth of 60 ft. The outcrop is reported to be 400 ft. long by 120 ft. wide.

To these two undertakings may be added the large Mary Kathleen uranium project between Mount Isa and Cloncurry, on the establishment of which between £A8,000,000 and £A10,000,000 will be spent. Heavy expenditure is to be incurred to bring the Townsville-Mount Isa railway up to the necessary standard, and it is rumoured that this work will involve the conversion from 3 ft. 6 in. gauge to 4ft.

8½ in. gauge. An important feature in the future of the north is Mount Isa Mines' £A3,000,000 copper refinery at Townsville.

The Northern Territory seems likely to be an important producer of uranium ore, though whether on a scale that will warrant an additional treatment plant to that at Rum Jungle is, as yet, uncertain. An extensive low grade silver-lead-zinc deposit near Rum Jungle is being explored by Zinc Corporation interests, and The Broken Hill Proprietary Co. is engaged on an intensive examination of the northern iron ore deposits in both North Queensland and the Northern Teritory.

COAL FREIGHTS DROPPING

Tramp shipping freight rates in the transatlantic coal trade so far this year have continued the downward trend evidenced at the close of 1956 following the panic peak of 117s. per ton at the time of the Suez crisis. However, for the time being at least, freight rates appear to have stabilized at the very low level of 47s. per ton. This is only a few shillings above the level at which the large tonnage of war-built Liberty ships would find the trade uneconomic and consequently shipowners are not so happy as of recent months.

There seems little prospect of coal freight rates rising at least until the autumn when there is usually a seasonal increase in European grain imports. The drop in freight rates has been reflected in the falling price of second-hand ships. Recently a Liberty ship has been sold for the dollar equivalent of £340,000; just over half the price obtained for a similar vessel last December.

Argentina is to resume heavy imports of coal from Poland, and it is expected that an agreement will soon be made for the purchase of 100,000 tons with the possibility of eventually reaching 500,000 tons yearly. Last year, Poland only provided 25,500 tons of coal towards Argentina's import needs of 1,500,000 tons.

THE AMAZON TASK IN BRAZIL

The rapidly increasing demand for minerals by the industrial nations, especially the United States, has provided a strong incentive to mineral exploration in Latin America. As noted by the Bank of Nova Scotia in a recent review of the mineral resources of Latin America, Brazil produces almost all the world's supply of quartz crystals. It has Latin America's largest known reserves of iron ore and large deposits of manganese north of the Amazon are being very actively exploited. Brazil's mineral potential is clearly very great, bearing in mind that much of the interior is still largely unexplored.

Several new discoveries regarded as potentially of commercial importance are reported by our Correspondent in Brazil.

The Rector of the Sao Paulo University has submitted specimens of uranium minerals, discovered at Aguas da Prata, Sao Paulo, to the State Governor and President Kubitscheck. The first chemical tests gave 0.24 per cent to 0.68 per cent of U308.

A deposit of high-grade manganese is reported from Muniz Freire, Espirito Santo.

The Amazon Research Institute reports the discovery of mercury on the Rio Urubu. A deposit of cinnabar was discovered near Dom Bosco, Minas Gerais, in 1939, but does not appear to have been exploited.

The Commission for the Economic Development of the Amazon Basin announces that an important deposit of cassiterite, with 72 per cent tin, has been located in the Rondonia Territory.

Another occurrence of cassiterite is confirmed in the municipality of Baturite. A concession has been granted to prospect and draw up definite plans for exploiting the deposit.

Control of Companhia Niquel de Tocantins has passed to Mining Engineer Jose Ermerio de Moraes, President of Industrias Votorantim and of Companhia Brasileira de Aluminio. The Minister of Transports has ordered a road to be built from Vazante to Patos de Minas to facilitate exportation of the mineral. The deposit is to be surveyed and mapped out from the air.

GREENLAND'S UNIQUE CRYOLITE DEPOSITS

The arctic Danish territory of Greenland is the only place in the world where cryolite occurs in sufficient quantities to make its extraction commercially worthwhile, writes Kjeld Rask Therkilsen in the "Danish Foreign Office Journal". In spite of competition from artificial cryolite, produced in various countries, Greenland natural cryolite is of outstanding importance in the great aluminium industry of to-day.

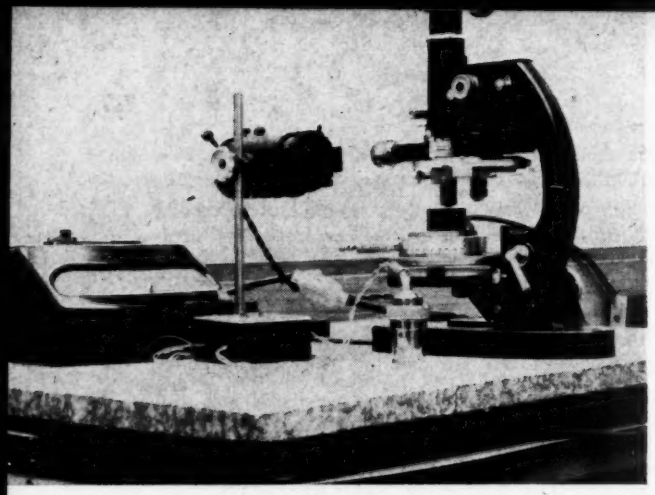
Drilling and blasting are carried on all the year round, day and night, in the open-cast mine at Ivigtut. The mineral occurs in fairly pure deposits in the form of large nodules embedded in the granite. When the granite and cryolite have been blasted out of the rock face, the material is transported through a long tunnel in the mountain-side to the harbour, whence it is shipped both to America and Denmark. The Danish mining company, employing the most rational, up-to-date methods throughout, is capable of supplying the world with cryolite for years to come, and geologists and geophysicists keep on prospecting for fresh deposits in these great age-old mountains.

The Danes began to mine cryolite in the 1850s. At first, the mineral was employed in the production of soda and alum, and it was thought that it could have no other use.

Nowadays, cryolite is mainly used in the production of aluminium—as a flux rather than as a raw material—and in the manufacture of enamel and opalescent glass. The valuable by-products which are extracted and processed find a market nearly all over the world and are used for widely different purposes. The steel industry employs the rejected fluorite and hagemannite. Ironworks takes over some of the siderite removed during refining, and by special treatment this is rendered suitable for the coating of welding rods. An insecticide is obtained by passing the dust from the factory air-cleaning plant and dust filters through a special atomizing process. Other by-products of cryolite include galena, zinc blende (sphalerite), and chalcopyrite, which are sold to metal-extracting works.

In the past fifty years well over a 1,000,000 tons of cryolite has been mined in Greenland. During the war the entire output went to the American war industries, chiefly the aircraft industry. About one-fourth of the annual shipments from Greenland still go direct to the United States, while the rest is sent to Denmark for processing. Last year's shipments totalled 38,000 tons. Of the refined products more than 99 per cent were exported to many countries in all parts of the world.

A Quick Method for Identifying Ores



Ore identification apparatus

A NEW simple to operate and extremely rapid method of identifying mineral ores was demonstrated in London at a recent Royal Society conversazione.

The method, which involves the fitting of a few simple additional pieces of equipment to a normal ore examination microscope, enables the identification of nearly all types of minerals to be carried out within a few minutes without the necessity for recourse to spectrographic, or X-ray methods.

The technique, developed by Mr. S. H. U. Bowie of the Atomic Energy Division of the Geological Survey of Great Britain in collaboration with Mr. K. Taylor of the same department, is particularly useful in identifying opaque minerals. It can be used to identify specimens of rocks of which even the thinnest sections that can be cut are opaque and where the long established methods for examining thin sections of rocks by shining light through them under a microscope are inapplicable.

By a Special Correspondent

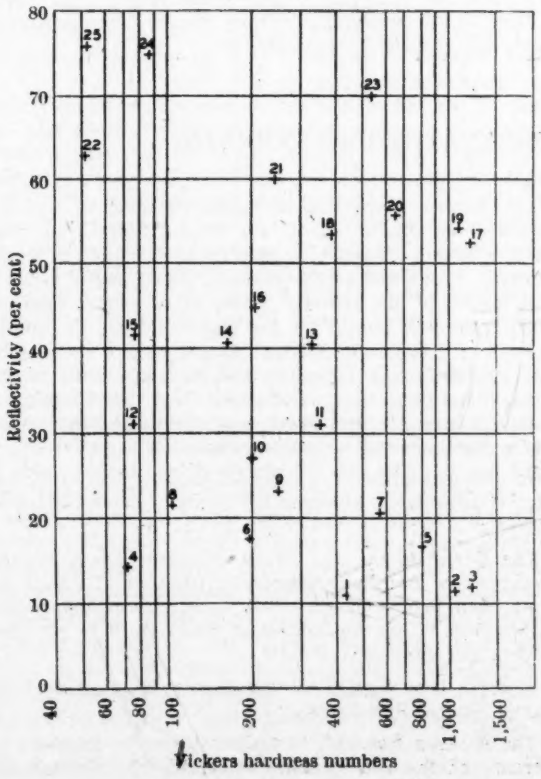
The basis of the technique consists of the measurement of the two qualities of reflectivity and hardness—measurements that can be carried out on mineral grains of down to about 30 thousandths of a millimetre in diameter. Each of these measurements can be completed on polished mineral sections in less than a minute. The equipment used consists of an electric cell photometer, for measuring the reflectivity, and a G.K.N. bench type hardness tester manufactured by Hall Telephone Accessories. Both the photometer and the hardness tester are fitted to the same standard ore microscope.

The measurement of the reflectivity is carried out by means of a small photo-electric cell which is interchangeable with the microscope eyepiece. With the aid of this device the reflectivity of the unknown mineral specimen is measured relative to a known standard using a tungsten filament lamp to provide illumination of specified colour temperature.

The precision with which the measurement can be carried out with the photo-electric cell and a spot galvanometer calibrated to reach percentage reflectivity direct—shows an accuracy more than enough for identification purposes when this measurement is combined with an exact measure of the mineral's hardness.

The hardness of the same mineral sample can be measured immediately after the completion of the reflectivity measurement. This is carried out by merely rotating the diamond pyramid of the hardness tester into the position previously occupied by the objective lens of the microscope, making the indentation and then returning the objective lens into place so that the size of the indentation can be measured.

The exact placing of the indentation is achieved by the combined use of a revolving objective lens holder to carry the diamond pyramid indenter of the hardness tester and a micrometer stage, which is used to ensure that precise positioning of the indentation which is necessary during measurement across the diagonals of the indentation made by the pyramid. By these means the positioning of the indentation can be achieved easily with a precision of less than five-thousandths of a millimetre. The indentation is actually made by pressing the indenter down on the specimen with a 100 gram weight.



Opposite : Values of reflectivity and hardness for twenty-five common ore minerals

1 Betafite	9 Alabandite	17 Cobaltite
2 Cassiterite	10 Cuprite	18 Niccolite
3 Chromite	11 Tetrahedrite	19 Pyrite
4 Covellite	12 Stibnite	20 Skutterudite
5 Uraninite	13 Pyrrhotite	21 Kennerite
6 Blende	14 Boulangerite	22 Altaite
7 Magnetite	15 Galena	23 Platinum
8 Bornite	16 Chalcopyrite	24 Antimony
		25 Gold

The measurement of the size of the indentation is made by measuring the distance across the diagonals of the indentation with the aid of an eyepiece micrometer.

Experience with the use of this technique has shown that it will enable minerals with the same reflectivity to be distinguished with ease one from another because of the variations in their indentation hardness. Simlarly minerals with the same indentation hardness can be separated just as easily because of their differing reflectivity.

The results of twenty-five such reflectivity determinations and indentation hardness measurements of a number of common ore minerals are shown.

The six additional items of equipment required for use with the standard ore microscope in order to carry out this simple, rapid and effective mineral ore identification technique are as follows :—

(1) An eyepiece micrometer for measuring the distance across the hardness indentations.

(2) A revolving objective lens holder carrying the hardness indenter.

(3) A micrometer stage for the precise positioning of the indentation.

(4) A photo-electric cell which is interchangeable with the microscope eyepiece.

(5) A spot galvanometer calibrated to read reflectivity direct.

(6) A stone slab mounted on spring shock absorbers to ensure that bench vibration—which could increase the size of the hardness indentation—is eliminated.

Mine Labour in Ghana

By G. Keith Allen, B.M.E.

Reader in Mining Engineering, Royal School of Mines, Imperial College of Science and Technology

The Gold Coast in 1935 had long borne a reputation arising out of its past history of being one of the less desirable countries in which to work, not only on account of its health record, but also, from the professional engineer's point of view, because of the generally unsuccessful nature of most of the gold mining enterprises in the past.

There was a widely held view, based on this, that the Gold Coast was no place for a career in mining, and one of the factors that undoubtedly did a lot to support that opinion was the nature of the usual staff agreement.

Main points were that the agreement was for *one* tour of nine months' service in the mine, followed by three months leave on half-pay—provided the employee signed a new agreement to return for a further term of service. Anything better designed to encourage the belief of impermanence of employment with the mining companies, and to discourage application from the more responsible type of applicant who wished to make a career in mining, can hardly be imagined, and one of the first matters undertaken in the middle 1930s was a revision of the terms of contract.

HEALTH always loomed large in Gold Coast affairs, and it was clear that unless an environment could be secured in which employees could live and work in reasonable security of health and comfort, the mining companies could not be expected to recruit and retain the kind of staff needed to operate the mines successfully.

By the time the expansion schemes already outlined had begun the mortality rate amongst Europeans was probably little different from that of most tropical countries, but diseases such as yellow fever occasionally broke out and served as a reminder that special hazards still existed in the country. By about 1936 this particular risk, however, was removed by the perfection of the yellow fever inoculation, and there then remained practically only malaria as the main cause of sickness and lost time due to tropical disease.

In the late 1930s a West African branch of the Ross Institute was formed and financed by the mining companies, and an intensive field study of the habits of the local species of mosquito was put in hand. Based on this work, and in collaboration with the mines' medical officers, the companies carried out schemes of drainage, bush clearing, oil spraying, etc., which most effectively reduced the mosquito population in the mining camp areas.

Considerable attention was paid to the design of mine staff houses. For example, in contrast to the practice in other European communities in the country, it became usual for mine houses to have protective wire screening on doors and windows. Not only did this add materially to comfort by keeping out other flying insects beside mosquitos, and by making the use of mosquito nets in bedrooms unnecessary, it also clearly reduced the incidence of malaria among the European staff.

It was generally believed in the Gold Coast that wire screening made interiors unbearably hot by preventing the circulation of air in the house has no substance if care is taken to site houses so that living and sleeping quarters receive the benefit of the local prevailing breeze. This was a precaution that far too often was overlooked when the older houses were built.

Even in the middle 1930s, Gold Coast mining companies were reluctant to give permission for the wife of an employee to accompany her husband to the mine, largely on account of the poor health and living conditions that obtained there at that time. It is a criterion of the success gained in improving such conditions that one of the problems that remains for some of the companies is to find sufficient accommodation, not only for wives but for children also. In the 1930s it was hardly contemplated that European children could live on the mines.

African employees live in houses provided by the mining companies or in villages and towns close to the mines. The proportion housed by the companies, varying from about 15 to over 90 per cent, is largely determined by the proximity and size of the villages and towns, and the labour strength. In general only a nominal charge for housing are made to African employees—about one penny per day being usual.

Free medical services are provided for all employees.

The first step taken was to make the contract continuous —subject to the usual clauses for its termination—and to grant leave pay as earned for past service and not hold it out as a bait for another tour. The conception of stability of employment was thus introduced and as time went on was reinforced with even better terms, until eventually full pay was granted on leave, and passages were paid for wives who wished to accompany their husbands to the mines. The length of tour was increased from 9 to 12 months for underground employees, and from 12 to 15 for surface staff, but living conditions had so vastly improved from those of earlier times that this increase was no hardship. The longer tours meant less staff on the companies' books, and a saving in cost of employees' passages.

There is no doubt that these changes went a long way towards improving the standards and the stability of the industry's employees.

Post-War Problems

The following outlines some of the problems of the post-war years.

As has already been mentioned, gold production reached a peak in 1941 when 885,712 oz. were produced. By this date, the progress of expansion was well advanced on most of the mines, and it seemed that an output of 1,000,000 oz. of gold per annum could be attained and kept at that level for some years to come. But it was not to be. In February, 1943, the British Government imposed a Concentration Scheme upon industry, this being a war-time measure affecting industries at home and abroad, designed to conserve supplies essential to the conduct of the war.

In the case of the gold mining industry of the Gold Coast three banket mines—Amalgamated Banket Areas, Gold Coast Banket Areas and South Banket Areas and the Marlu mine—were closed down, the main purpose being to conserve diesel and fuel oil. The scheme ended on March 1, 1946, and cost the contributing companies £578,000.

After the war the task of rehabilitating the closed-down mines and completely unfinished expansion programmes on the other mines suffered many setbacks. Delays in fulfilling orders for supplies and equipment seemed never-ending, while prices steadily rose and the cash resources of many of the companies were seriously depleted.

Some 50 per cent of the African labour force of the gold mines migrates from the Northern Territories and the adjacent French country. Most of the underground labour comes from this source; they are Moslems and are generally illiterate. Turnover is high and in the early post-war years was generally reckoned to be at least 100 per cent per annum, though recently it is stated to be about half of this figure. There is no indentured labour in the Gold Coast and its control is therefore more difficult than in those countries where it is engaged under contract and housed in mine compounds.

In an attempt to improve the situation the companies were encouraged to set up centres in the Northern Territories from where those seeking employment were transported to the south in lorries after passing a preliminary examination. The scheme lasted little more than two years and failed because there was no practical way of ensuring that labour thus engaged would reach the mines or remain at work if it did. It was not uncommon for less than 10 out of a batch of 35 that left the centre to reach the mines, and for not more than one or two of the batch to remain at work longer than a month. The opportunity of a free ride south and the temptations of the gay city of Kumasi, through which they passed on the journey, were too much for most.

To improve the health and efficiency of its African workers the mining companies in 1947 built canteens to supply cooked meals at less than half cost. Unfortunately, the venture was unsuccessful on all the gold mines because, by long-established custom, the retail sale of food to African workers is in the hands of women, locally known as "Mammies", who are wives and relations of the local Africans domiciled in the mining areas. The canteen scheme cut across these powerful vested interests and the final result was a boycott engineered by the African Mines Employees Union. This Union was registered in 1945 and has done little to improve labour relations which at that time had already begun to deteriorate rapidly. Inflation and other post-war conditions had made labour restless.

Dissatisfied with a wage offer made by the Chamber of Mines representing the industry, the Union called a strike which lasted throughout October, 1947, and which was finally settled by an Arbitration Award. The increase in wages which resulted was particularly serious for the low-grade banket mines and the Marlu mine, for, although the price of gold had increased from 168s. in 1939 to 172s. 3d. per oz in 1945, equivalent to an increase of approximately 1s. per ton of banket ore, wages in that same period had gone up by about 6s. per ton. The margin of profit of these mines was already low and they could ill-afford the further increase in wages that now faced them. Relief came just in time when gold was devalued in September, 1949, and the price rose to 248s. per oz., and even higher in 1952 when the companies were permitted to sell their bullion on the free market. The benefit of the increased selling price of gold was, however, short-lived. Wages and costs continued to rise, and in the end profits again became marginal.

In 1947 these conditions were especially hard on those mines which had been closed down under the Concentration Scheme, for in order to help the others to maintain production during the war they had released to them a large proportion of their stores and equipment which now had to be replaced. In addition, these mines had lost their labour force and were in the position of having to build up again almost from scratch in competition with the well-established producing mines.

Africanization

The local Africans have always performed skilled technical work on the mines; for example, they drive main shaft winders, operate machine tools in the workshops and carry out responsible secretarial work in the offices. All of this work, however, has been under the supervision of Europeans and seldom has an African, on the bigger mines at least, been classed as the head of a department responsible directly to the manager. But since the last war especially strong agitation has developed for placing Africans in higher positions of responsibility in the industry. The mining companies were prepared to meet these desires as far as possible but, in the interests of safe working and the well-being of the companies, could only insist that candidates for these positions possessed the education and experience needed to fill them satisfactorily. Few, if any, Africans fulfilled these conditions, but the companies undertook to provide practical experience to selected candidates before they proceeded abroad for higher technical education. Under a Government-sponsored scheme, six of such trainees are now studying at the Camborne School of Mines, four in their 2nd year and two in their 1st year, and five others are at the Camborne Technical College.

Tunnelling for Power

An Atlas Copco BBD 41 rock drill in use at the Lednock Tunnel. Two tunnelling crews drove 1,621 ft. in a 30-day working period

A FIGURE which must approach a record for sustained tunnelling over a period of 30 working days has been announced by R. J. McLeod (Contractors) Ltd., contractors for The North of Scotland Hydro-Electric Board's Lednock Tunnel. Driving this tunnel of 8 ft. bed-width through hard porphyry rock, the company's tunnelling crews recently achieved a figure of 1,621 ft. for a 30-day period based on a total working week of 134 hrs.

The Lednock Tunnel is part of the Breachlaich section of the Breadalbane Project (see *M.J.* of July 29, 1955). Two seven-day tunnelling records have been achieved in the past two and a half years on the adjacent St. Fillans Section of the same project. This lined pressure-tunnel, 13,000 ft. in length with a gradient of 1 in 75, over the distance driven in this period will carry water from Lochan Breachlaich to the generating station at Glen Lednock.

The Labour Force

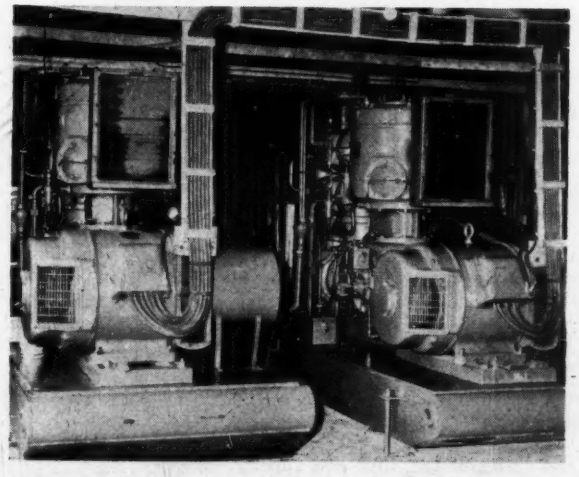
Work on the portal began last Christmas, and actual tunnelling operations started on January 21. The tunnel is being driven from one heading at the Lednock end. Over the 5-week period concerned the number of rounds fired was 241 with an average pull of 6 ft. 9 in. and the total footage drilled was over 41,500 ft. Best weekly advance was 429 ft. The tunnelling crews with one foreman in charge consisted of :—

Day Shift		*Night Shift*
Shift boss	1 Compressor man/drill doctor	Shift boss
5 Machine men	1 Fitter	6 Machine men
1 Loco driver	1 Welder/blacksmith	1 Loco driver
1 Eimco driver	1 Electrician	1 Eimco driver
2 Tip men	1 Handyman	2 Tip men
3 Platelayers		1 Compressor man
1 Powder monkey		1 Handyman

The working week began at 10 o'clock on Sunday night, the next shift taking over at 8 a.m. Monday. The men then worked on a basis of two 12-hr. shifts.

The average cycle of operations was 3-hrs., consisting of 45 mins. for drilling, 20 mins. charging and blasting, 40 mins. to allow the atmosphere to clear and for meal breaks and 1 hr. 15 mins. for mucking. The drilling period using five Atlas Copco BBD 41 drills was often completed in 35 mins. The best time for a full cycle was 2 hrs. 15 mins.

Two Atlas Copco AR 3 skid-mounted compressors at Lednock. These machines maintain a required pressure of 95 lb. p.s.i. at the face



Working Equipment

The equipment in use at Lednock Tunnel consisted of : 7 Atlas Copco BBD 41 WK drills with BMK pusher-legs (2 drills in reserve). These machines weigh 50 lb. and have a speed of 3,000 impacts per min. Sandvik Coromant drill-steels (7 ft. 10 in.) were employed for all operations to save time on changing, average life exceeded 750 ft.

An Eimco "21" rocker shovel, which shifted 15 cu. yd. per round, was used on a 2-ft. gauge. A B.E.V. (Wingrove and Rogers Ltd.) electric loco with Hudson 1½-yd. skips—side tipping—removed the rock from the tunnel face, and a moveable loop, 100 ft. in length, was employed for switching. Two Atlas Copco AR 3 skid-mounted compressors gave a required pressure of 95 lb. p.s.i. at the face.

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Consulting engineers for the Lochan Breachlaich section of the Breadalbane Scheme are Duff and Geddes in association with R. H. Cuthbertson, both of Edinburgh.

The first step taken was to make the contract continuous —subject to the usual clauses for its termination—and to grant leave pay as earned for past service and not hold it out as a bait for another tour. The conception of stability of employment was thus introduced and as time went on was reinforced with even better terms, until eventually full pay was granted on leave, and passages were paid for wives who wished to accompany their husbands to the mines. The length of tour was increased from 9 to 12 months for underground employees, and from 12 to 15 for surface staff, but living conditions had so vastly improved from those of earlier times that this increase was no hardship. The longer tours meant less staff on the companies' books, and a saving in cost of employees' passages.

There is no doubt that these changes went a long way towards improving the standards and the stability of the industry's employees.

Post-War Problems

The following outlines some of the problems of the post-war years.

As has already been mentioned, gold production reached a peak in 1941 when 885,712 oz. were produced. By this date, the progress of expansion was well advanced on most of the mines, and it seemed that an output of 1,000,000 oz. of gold per annum could be attained and kept at that level for some years to come. But it was not to be. In February, 1943, the British Government imposed a Concentration Scheme upon industry, this being a war-time measure affecting industries at home and abroad, designed to conserve supplies essential to the conduct of the war.

In the case of the gold mining industry of the Gold Coast three banket mines—Amalgamated Banket Areas, Gold Coast Banket Areas and South Banket Areas and the Marlu mine—were closed down, the main purpose being to conserve diesel and fuel oil. The scheme ended on March 1, 1946, and cost the contributing companies £578,000.

After the war the task of rehabilitating the closed-down mines and completely unfinished expansion programmes on the other mines suffered many setbacks. Delays in fulfilling orders for supplies and equipment seemed never-ending, while prices steadily rose and the cash resources of many of the companies were seriously depleted.

Some 50 per cent of the African labour force of the gold mines migrates from the Northern Territories and the adjacent French country. Most of the underground labour comes from this source; they are Moslems and are generally illiterate. Turnover is high and in the early post-war years was generally reckoned to be at least 100 per cent per annum, though recently it is stated to be about half of this figure. There is no indentured labour in the Gold Coast and its control is therefore more difficult than in those countries where it is engaged under contract and housed in mine compounds.

In an attempt to improve the situation the companies were encouraged to set up centres in the Northern Territories from where those seeking employment were transported to the south in lorries after passing a preliminary examination. The scheme lasted little more than two years and failed because there was no practical way of ensuring that labour thus engaged would reach the mines or remain at work if it did. It was not uncommon for less than 10 out of a batch of 35 that left the centre to reach the mines, and for not more than one or two of the batch to remain at work longer than a month. The opportunity of a free ride south and the temptations of the gay city of Kumasi, through which they passed on the journey, were too much for most.

To improve the health and efficiency of its African workers the mining companies in 1947 built canteens to supply cooked meals at less than half cost. Unfortunately, the venture was unsuccessful on all the gold mines because, by long-established custom, the retail sale of food to African workers is in the hands of women, locally known as "Mammies", who are wives and relations of the local Africans domiciled in the mining areas. The canteen scheme cut across these powerful vested interests and the final result was a boycott engineered by the African Mines Employees Union. This Union was registered in 1945 and has done little to improve labour relations which at that time had already begun to deteriorate rapidly. Inflation and other post-war conditions had made labour restless.

Dissatisfied with a wage offer made by the Chamber of Mines representing the industry, the Union called a strike which lasted throughout October, 1947, and which was finally settled by an Arbitration Award. The increase in wages which resulted was particularly serious for the low-grade banket mines and the Marlu mine, for, although the price of gold had increased from 168s. in 1939 to 172s. 3d. per oz in 1945, equivalent to an increase of approximately 1s. per ton of banket ore, wages in that same period had gone up by about 6s. per ton. The margin of profit of these mines was already low and they could ill-afford the further increase in wages that now faced them. Relief came just in time when gold was devalued in September, 1949, and the price rose to 248s. per oz., and even higher in 1952 when the companies were permitted to sell their bullion on the free market. The benefit of the increased selling price of gold was, however, short-lived. Wages and costs continued to rise, and in the end profits again became marginal.

In 1947 these conditions were especially hard on those mines which had been closed down under the Concentration Scheme, for in order to help the others to maintain production during the war they had released to them a large proportion of their stores and equipment which now had to be replaced. In addition, these mines had lost their labour force and were in the position of having to build up again almost from scratch in competition with the well-established producing mines.

Africanization

The local Africans have always performed skilled technical work on the mines; for example, they drive main shaft winders, operate machine tools in the workshops and carry out responsible secretarial work in the offices. All of this work, however, has been under the supervision of Europeans and seldom has an African, on the bigger mines at least, been classed as the head of a department responsible directly to the manager. But since the last war especially strong agitation has developed for placing Africans in higher positions of responsibility in the industry. The mining companies were prepared to meet these desires as far as possible but, in the interests of safe working and the well-being of the companies, could only insist that candidates for these positions possessed the education and experience needed to fill them satisfactorily. Few, if any, Africans fulfilled these conditions, but the companies undertook to provide practical experience to selected candidates before they proceeded abroad for higher technical education. Under a Government-sponsored scheme, six of such trainees are now studying at the Camborne School of Mines, four in their 2nd year and two in their 1st year, and five others are at the Camborne Technical College.

Tunnelling for Power

An Atlas Copco BBD 41 rock drill in use at the Lednock Tunnel. Two tunnelling crews drove 1,621 ft. in a 30-day working period

A FIGURE which must approach a record for sustained tunnelling over a period of 30 working days has been announced by R. J. McLeod (Contractors) Ltd., contractors for The North of Scotland Hydro-Electric Board's Lednock Tunnel. Driving this tunnel of 8 ft. bed-width through hard porphyry rock, the company's tunnelling crews recently achieved a figure of 1,621 ft. for a 30-day period based on a total working week of 134 hrs.

The Lednock Tunnel is part of the Breachlaich section of the Breadalbane Project (see *M.J.* of July 29, 1955). Two seven-day tunnelling records have been achieved in the past two and a half years on the adjacent St. Fillans Section of the same project. This lined pressure-tunnel, 13,000 ft. in length with a gradient of 1 in 75, over the distance driven in this period will carry water from Lochan Breachlaich to the generating station at Glen Lednock.

The Labour Force

Work on the portal began last Christmas, and actual tunnelling operations started on January 21. The tunnel is being driven from one heading at the Lednock end. Over the 5-week period concerned the number of rounds fired was 241 with an average pull of 6 ft. 9 in. and the total footage drilled was over 41,500 ft. Best weekly advance was 429 ft. The tunnelling crews with one foreman in charge consisted of :—

Day Shift		*Night Shift*
Shift boss	1 Compressor man/drill doctor	Shift boss
5 Machine men	1 Fitter	6 Machine men
1 Loco driver	1 Welder/ blacksmith	1 Loco driver
1 Eimco driver	1 Electrician	1 Eimco driver
2 Tip men	1 Handyman	2 Tip men
3 Platelayers		1 Compressor man
1 Powder monkey		1 Handyman

The working week began at 10 o'clock on Sunday night, the next shift taking over at 8 a.m. Monday. The men then worked on a basis of two 12-hr. shifts.

The average cycle of operations was 3-hrs., consisting of 45 mins. for drilling, 20 mins. charging and blasting, 40 mins. to allow the atmosphere to clear and for meal breaks and 1 hr. 15 mins. for mucking. The drilling period using five Atlas Copco BBD 41 drills was often completed in 35 mins. The best time for a full cycle was 2 hrs. 15 mins.

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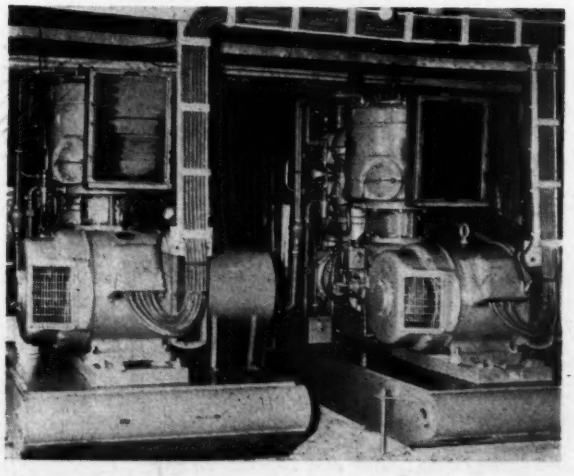

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A Century of Engineering Progress

ON January 1, 1857, there came into being the firm of Ruston, Proctor and Burton, which has played a leading part in the progress of engineering manufacture during the past hundred years. Joseph Ruston, who served his apprenticeship with an eminent firm of Sheffield cutlers, was among the first to appreciate the opportunities presented by the coming Agricultural Revolution in England. He accordingly entered into partnership with Burton and Proctor, of Lincoln, two highly-skilled craftsmen specializing in the production and repair of agricultural implements. The story of the world-famous organization which resulted is told by Bernard Newman in an absorbing and lavishly illustrated book published on the occasion of the Ruston Centenary, 1857-1957.

Of particular importance historically is the fact that the organization produced the world's first commercially successful oil engine, which was manufactured as the Hornsby-Akroyd in 1892, thus preceding the introduction of the diesel engine by some years. This engine, which was immediately successful, was a horizontal hot-bulb prime mover of 11 in. bore x 15 in. stroke, producing 9½ b.h.p. at 200 r.p.m. Subsequent work on oil engines by the firm was marked by the very early introduction of vertical and cold-starting engines, and the adoption of the pressure-charged unit in the 1920s.

By the turn of the century, Hornsby's had successfully fitted the early Hornsby-Akroyd diesel engine to a locomotive and had gone on to build others for surface work. By 1930, the diesel engine in its present form was an acknowledged power unit, and it was the logical outcome that Ruston's should turn their attention to collieries and other mines.

Problems Associated With Diesel Locos

The first objection to diesel locos was the question of noxious fumes from the exhaust. In 1932, Ruston's designed a conditioner which made the exhaust completely safe. A locomotive fitted with this special equipment was the first diesel to work underground—in a gypsum mine.

The second problem was a tougher one, namely the fire and explosion hazard. Fitted with a special flame-trap on the exhaust, the first Ruston diesel loco of this type went into a Belgian mine. The designer's efforts were recognized by a Certificate of Approval issued by the Continental Bureau of Mines. After further research and some modification, Ruston's put forward a flameproof locomotive for tests by the British Mines Department. The proposal was a revolutionary one and the tests at Buxton went on for years. Finally, however, the official experts were satisfied. On May 25, 1939, Certificate No. 1 covering the "Approval of Internal Combustion Engine" was issued to Ruston and Hornsby.

Features of the programme initiated in Britain by the National Coal Board after the war were froth flotation plant, mechanical handling equipment, and diesel locomotives. A large number of the underground locomotives are Ruston's. On the surface, Ruston shunters haul long trains of rolling stock. Abroad—in China, Spain, India, Chile, Canada and South Africa—both types of machines have become essential features of practice, not only in collieries, but in gold, diamond, base metal and other mines.

Opencast coal production, which in Britain is running at well over 10,000,000 tons a year, depends on mechanical equipment for stripping the layers of soil, quarrying the coal, and the subsequent replacement of the earth. Ruston diesel locomotives and Ruston-Bucyrus excavators and draglines are used in large numbers on many of these sites.

Large-scale opencast working, though almost a novelty in England, is quite common in Ireland, where mechanical equipment is being increasingly employed in the cutting and handling of peat. Most of the haulage locomotives used in Ireland's peat industry came from Lincoln, as did the engines for pumps and generating sets; many Ruston-Bucyrus's excavators are also in service in Irish peat bogs.

Other Enterprises

Some years before the Second World War, Ruston's began the manufacture of their "Thermax boiler", the only three-pass wet-back type of boiler on the British market and still one of the most efficient shell-type boilers in existence. More recently—in 1951—they introduced series production of a standard gas turbine, two of which are the first in the world to operate on coal tar fuel.

The development of steam power for the land and industry followed shortly after the amalgamation of Ruston, Proctor and Richard Hornsby in 1918, and each firm specialized in additional lines—the former in steam excavators and the latter in steam locomotives. Other products were the famous "Stockport" gas engines, centrifugal pumps, and boilers of all types.

One of the most interesting enterprises undertaken by Hornsby in the early part of this century was the development of Mr. David Robert's chain track tractor. Successfully demonstrated before War Office officials in 1908, it was nicknamed "caterpillar"—a term which entered the language. The machine was the forerunner of the tank and the present-day tracked vehicle.

Eleven years after the amalgamation, the manufacture of agricultural equipment ceased and production was concentrated on diesel engines, diesel-engined locomotives, boilers and pumps. In 1930, Ruston's entered into an agreement with the American firm, Bucyrus-Erie, and the British organization Ruston-Bucyrus was formed. In 1940, the Lincoln engineers took control of Davey, Paxman Ltd., the Colchester firm noted for its vee-form engines.

To-day, the five Lincoln works alone occupy over 100 acres and more than 9,000 people are employed at the Lincoln, Grantham and Colchester plants. They produce vertical and horizontal engines up to 2,400 b.h.p.; shunting and surface and underground narrow-gauge diesel locomotives; boilers and pressure vessels; pumps; and the post-war gas turbine of 1,300 b.h.p., which is now in operation in every continent. Over 100 agents—many having a considerable number of branches in their own organization—serve Ruston and Hornsby interests throughout the world.

Stepping into its second century, the firm has anticipated a demand likely to arise in the next few years by setting up a nuclear project department. Among other developments of considerable importance currently taking place are new ranges of engines, the adoption of new methods of charging and transmission, and new turbine designs.

Machinery and Equipment

Largest British Tower-mounted Coal Winder

The first of three Metropolitan-Vickers tower - mounted single - rope friction winders for the new Rothes Colliery of the Scottish Division of the National Coal Board has now been commissioned. The picture below shows two winder towers at Rothes.

This winder is the largest tower-mounted installation in the country and the twin d.c. geared motors have a total rating of 3,780 h.p. (R.M.S.). The motors operate on the Ward-Leonard principle with manual closed loop control using the metadyne system.

Metropolitan-Vickers are the main contractors for the winders and supplied most of the electrical equipment installed at the colliery surface. The mechanical parts of the winder were manufactured by Markham and Co., acting as sub-contractors to Metropolitan Vickers.

In the initial stages of the Rothes project, which forms a vital link in the systematic development of the extensive Fife coalfield, Metropolitan-Vickers were engaged as the co-ordinating engineers and carried out this work until the N.C.B. took it over themselves.

GIANT WELDED ROCK CRUSHER

A new ore and rock crusher has been added to the range of plant produced by Pegson Ltd. This unit is a double toggle primary jaw crusher.

Quasi-Arc Ferron electrodes were used for the fillet welding in this fabrication, which was carried out to Pegson design by the Furness Shipbuilding Co. The largest machine of its kind with fabricated steel sides now being made in the United Kingdom, the crusher has a 100-150 h.p. drive. The sectional steel body has end walls of cast steel and the side walls, which are of 2½ in. thickness, are of welded steel.

Each side weighs approximately 9 tons and the complete machine weighs 60 tons. The feed opening to the crusher jaws is 48 in. wide by 36 in. long, and the machine crushes rock of 36 in. x 30 in. x 28 in. approximate size.

The output of crushed rock varies between 120 and 300 tons per hour, depending on the crusher setting and the type of material being handled.

SELENIUM DETECTION KIT

How to assemble and use a simple do-it-yourself kit for detecting the valuable element selenium is told in a U.S. Bureau of Mines pamphlet recently released. The equipment and procedures are so simple that a person unskilled in metallurgy or chemistry can detect the presence of minute amounts of selenium.

Developed originally to aid in a Bureau field survey of selenium resources of the United States, the kit and method proved virtually foolproof and was found capable of detecting as little as one one-thousandth of one per cent selenium (10 parts per million), in specimens.

Although selenium, which sells for about $15 per lb. is widely distributed in the United States, known deposits are so low grade they cannot be processed for that element alone. Commercial output to-day comes as a by-product in refining other metals, chiefly copper. Yet the selenium content of the average copper ore is so small that only one pound is found in 160 tons of ore.

The Bureau's report lists these four chemicals as essential for the tests: Potassium pyrosulphate powder, granular sodium peroxide, powdered tartaric acid, and sodium hydroxide pellets.

TWO NEW BRITISH STANDARDS

Notice lately has been received of two British Standards. A revised edition of what is, in effect, the key specification for the enclosure of electrical apparatus for use in situations where flammable or explosive gases or vapours may be present, has recently been issued by the British Standards Institution (B.S. 229; 1957).

Following continued research by the British Electrical and Allied Industries Research Association in collaboration with the Safety in Mines Research Establishment, the method of assessing the statistical maximum safe-gap for the gases and vapours has been reconsidered with the result that a more precise method of grouping than that of the 1946 edition of the standard has been evolved. Requirements in Group II for the sleeve bearings of large rotating machines for gases and vapours have been changed to make the construction and operation of the apparatus more practicable. Presentation and arrangement of the subject matter of the standard has been changed in the interests of greater clarity.

The publication of B.S. 2826 for heavy-duty safety helmets marks another important stage in the provision of standard safety equipment.

The significant difference between the light—and the heavy-duty standard is that whereas the former prescribes a shock-absorption test of 28 ft. lb. the latter involves a test of 40 ft. lb.

MINING MISCELLANY

Three State-owned undertakings are reported to be preparing to mine rich deposits of sulphur pyrites at Grong, North Trondelag, Norway, where there are known to be deposits of 18,000,000 tons with the possibility of large undiscovered reserves.

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Three Australian mining companies—United Uranium, Loloma Gold Mines, and King Island Scheelite—have been given permission to prospect over the whole of the Maranboy tin fields, about 40 miles from Katherine in the Northern Territory.

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The Eire Minister for Industry and Commerce, Mr. Lemass, has stated in Parliament that he does not know whether the cessation of operations at the mines of the St. Kevin's Lead and Zinc Co. at Glendalough, County Wicklow, is permanent or temporary. St. Kevin's ceased mining operations about two months ago, indicating that the company was awaiting a geologist's report on the mineralization. Reports claiming that the company had been forced to close down through the fall in the world price of copper have not been denied.

★

Noranda Mines, of Northern Quebec, has completed arrangements to buy approximately $2,675,000 of debentures of Coldstream Copper Mines, which is in course of bringing into production a copper property in the Thunder Bay area of north-western Ontario. The purchase was made from Mogul Mining Corporation, with payment to be spread over 12 months. Noranda will be able to acquire an equity position in Coldstream by exercising some 550,000 stock purchase warrants at $1, which go with the 5½ per cent sinking fund debentures.

★

As a result of increased freight and refining charges abroad, the Caja de Credito y Fomento Minero, of Chile (CACREMI), decided to suspend indefinitely all exports of ore and concentrates in favour of refining them at Paipote, although the present plant is inadequate to deal with the total output of the smaller and medium mines. The saving is estimated at U.S.$3,000,000 annually. CACREMI is to use the proceeds of loans up to a value of Ch.$3,000,000,000, contracted by the President of the Republic and taken up by various semi-fiscal organizations, for the expansion of existing mining plants, purchases of machinery and equipment, and of mineral ores.

★

The United States-South Korean Combined Economic Board has announced that American and Korean engineers will shortly conduct a large-scale search for mineral deposits in the South Korean mountains. The board said the search programme, scheduled to begin in July, would include an aerial survey by a plane equipped with a magnetometer. There has been no scientific survey in South Korea to determine mineral resources. During 1956 Korea's mining industry produced 1,550 kg. of gold, 6,100 kg. of silver, 62,000 tons of iron ore, 14,000 tons of copper ore, 3,000 tons of lead ore, 3,800 tons of tungsten ore, 25 tons of molybdenite, 600 tons of bismuth, 2,000 tons of manganese ore, 500 tons of crystalline graphite, 60,500 tons of amorphous graphite, 8,000 tons of kaolin, 6,300 tons of talc and 3,000 tons of fluorspar.

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According to the chairman, Mr. J. C. Westhoven, Western Titanium NL, of Western Australia, should soon be earning profits which would allow payment of regular dividends. Estimated life of the mine is more than 30 years on the basis of present costs and metal values, even if throughput is increased from 200,000 to 300,000 tons of crude sands a year. Ilmenite production has been increased from about 800 tons a week at the end of January to the current rate of 1,250—1,400 tons.

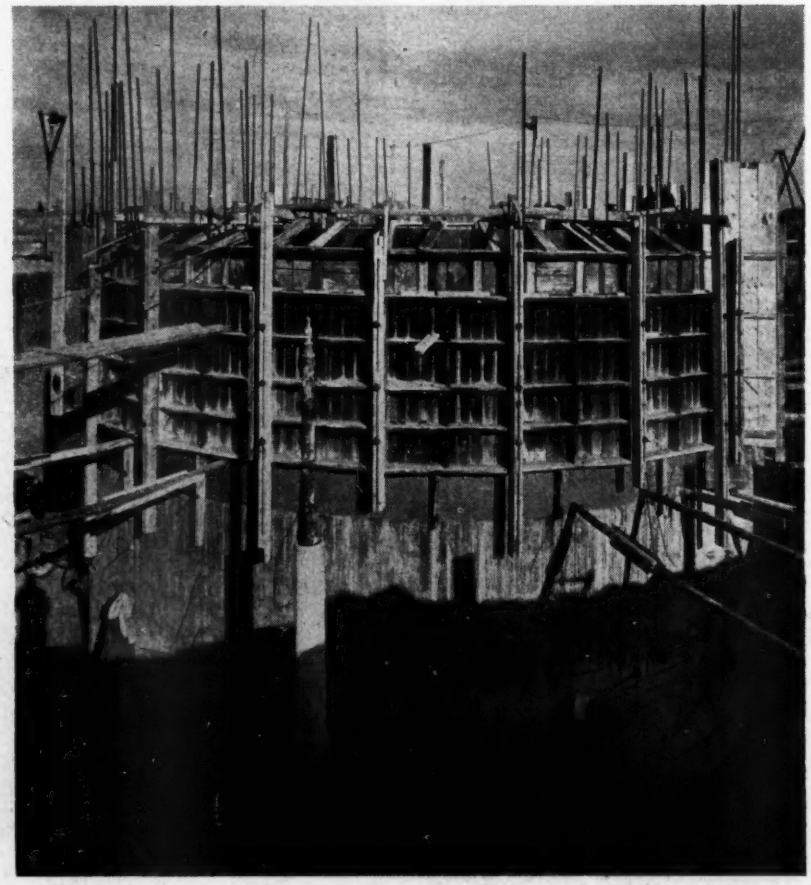
★

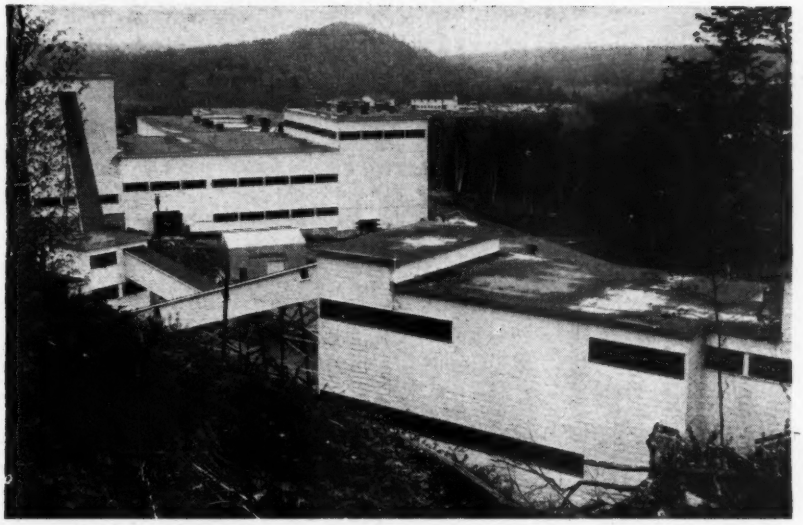
New iron ore deposits have been discovered in Western Siberia during oil prospecting not far from the town of Kolpashevo in the Tomsk region. The seams contain 36 per cent iron and in some places this rises to 40 per cent and more. Europe's largest deposits in Alsace and Lorraine have an iron content of about 32 per cent. Tentative estimates of the size of the Kolpashevo deposits indicate that they contain billions of tons. The discovery of other very large deposits of iron ore in the area of Belgorod, a town in the southern part of European Russia, has opened up prospects for the development of an important metal-producing area. Preparations are already being made for open-cast mining there, and large-scale mining is apparently to begin in the area within the next few years.

★

The official opening of the 1,000-ton mill of Faraday Uranium Mines took place on May 30. Faraday is the second uranium mine in the Bancroft field, Canada, to reach production, which was started on April 4 after an expenditure of $10,000,000. The draft of an agreement

The Riebeeck headgear in the Orange Free State will be the first concrete headgear to be used in that goldfield. A novel method of construction was used for the collar foundation. The concrete caisson shown here was cast on surface in sections and allowed to sink into the ground under its own weight. When a depth of 50 ft. had been reached, ground on the exterior of the caisson was excavated to a depth of 25 ft. The excavation was then back-filled with a soil-cement mixture and consolidated by means of a tractor. Work will commence on the continuous casting of the concrete headgear about the middle of June





In our issue of May 17, 1957, it was noted that Faraday Uranium Mines had made its first shipment of uranium precipitate. Faraday is the second uranium mine in the Bancroft area of Canada to reach production. The illustration shows the crusher house in the foreground, conveyors and concentrator

with Faraday covering treatment of ore from another producer, Greyhawk Uranium Mines, has been announced. Regular deliveries of Greyhawk ore to Faraday at the rate of 250 tons daily are expected to start by mid-July.

★

An agreement has been signed between the Turkish Government and a German firm for the construction of a new rolling mill at Karabuk. The mill, which will take about 20 months to construct, will cost £T25,000,000 internally and £T40,000,000 externally. It will produce 230,000 tons annually of various products ranging from wire to metal sheets. With the completion of the new mill, the total planned capacity of the Karabuk plants will reach about 700,000 tons. As part of this development contracts have already been signed for the installation of new steel furnaces and other equipments.

★

A new coal-mining enterprise has been formed in Formosa by the China Coal Mining Exploration Co. The capital was put up by the Taiwan Power Co., the Taiwan Sugar Corporation, and the Chinese Petroleum Co.—three of the biggest consumers on the island. By having their own coal company, these consumers hope to obviate the recurrent supply-failures of the past few years. These were attributed recently by the chairman of the Taiwan Coal Products Association to fluctuating government policy, which since 1950 has changed from full control of the coal industry to de-control, subsequently veering towards semi-control.

PERSONAL

Sir Walter Puckey has joined the board of Black and Decker Ltd. Mr. F. W. McCartney, assistant general manager, becomes assistant managing director, and Mr. W. O. Bell, acting production director, becomes production director.

★

Mr. D. C. D'Arcy Bliss, Mr. G. Gordon Davis and Mr. R. K. Rennie have been appointed directors of International Harvester Co., of Great Britain, Ltd.

★

Mr. D. R. Bowers has been appointed sales manager, Earthmoving Equipment Division, of Fred Myers Ltd., the authorized dealers for Caterpillar Tractor Co. in London and South-East England.

★

The record number of 750 delegates attended the 1957 National Industrial Safety Conference, organized by the Royal Society for the Prevention of Accidents and held at Scarborough, May 31—June 2.

★

The appointment of nine leading companies in the field of earth-moving equipment, repair and sales as Chaseside Service/Sales Agents, marks a further expansion in the Chaseside service network. These companies are Hailes Plant Depot, of Edinburgh; Marshall Branson Ltd., of Blaydon-on-Tyne; William G. Search Ltd., of Leeds; Gaylord, Edwards and Co. Ltd., of Nottingham; Reginald Tildesley Ltd., of Willenhall; Plant Repair and Services (South Wales) Ltd., of Cardiff; William R. Selwood Ltd., of Chandlers Ford, Hants; Henry Norrington and Son Ltd., of Exeter; and Gilbert Rice Ltd., of Horsham.

★

On June 1 the Blackman Export Co., Ltd., a subsidiary of Keith Blackman Ltd. moved office from 23 Queen Square, London, W.C.1, to the parent company's head office at Mill Mead Road, London, N.17. At the same time Keith Blackman Ltd. opened a London Area Sales Office at the Queen Square address vacated by the Blackman Export Co. Ltd.

★

Owing to continued expansion, Megator Pumps and Compressors Ltd. have acquired extra premises at 6 Carlos Place, London, W.1, to house their supply department. All correspondence should still be addressed to the head office at 43 Berkeley Square, London, W.1.

AGENCIES WANTED

Orgamec S.A. of Rua Mexico, 3—2° andar, Rio de Janeiro, Brazil, wish to contact U.K. manufacturers of electronic or other types of instruments for processing and evaluating meteorological and geophysical data. Manufacturers interested should write direct to Orgamec S.A., at the same time notifying the British Embassy, Commercial Department, Caixa Postal, 669 Rio de Janeiro, that they have done so. B.O.T. Ref., E.S.B./11226/57. Telephone enquiries to Chancery 4411, extension 776 or 866.

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Mr. R. E. Childs, managing director of the Anglo-Australian Marketing Group Pty. Ltd., 3 St. Peters Street, Darlinghurst, Sydney, was scheduled to arrive in the U.K. on June 3, and to be in London until August 3. He is interested in representing U.K. firms in the electrical and allied lines in Australia or in manufacturing products under licence. He will be pleased while in London to give assistance to U.K. electrical manufacturers on market conditions in Australia. Manufacturers interested should write to Mr. Childs, c/o Messrs. W. and E. Kupfer Ltd., 38 Glasshill Street, London, S.E.1. They are asked to copy their letters to the Export Services Branch, Room 722, Lacon House, Theobalds Road, London, W.C.1. B.O.T. Ref.: E.S.B./12905/57.

CONTRACTS AND TENDERS

The following future authorizations have been announced by the International Co-operation Administration (I.C.A.):—

	Contract Period	*Terminal Delivery Date*	*Amount (in U.S. dollars)*
Bolivia			
Construction, mining and conveying equipment (PA No. 11-740-99-H1-7212)	30/4/57-31/10/57	30/4/58	51,000
Vietnam			
Aluminium, aluminium base alloys and products (PA No. 30-691-99-H9-7329)	30/4/57-31/10/57	30/4/58	300,000
Non-metallic minerals and mineral products (PA No. 30-640-99-H9-7320)	30/4/57-31/10/57	30/4/58	1,250,000
Zinc and zinc base alloys and zinc products (PA No. 30-695-99-H9-7323)	30/4/57-31/10/57	30/4/58	50,000
Tin and tin base alloys and products (PA No. 30-696-99-H9-7322)	30/4/57-31/10/57	30/4/58	50,000
Israel			
Aluminium and aluminium base alloys and products	29/4/57-31/10/57	30/4/58	200,000

B.O.T. Ref.: E.S.B./12962/57 I.C.A. Telephone enquiries to Chancery 4411, extension 360.

Metals and Minerals

Beryllium's Nuclear Applications

In a lecture delivered in Stockholm earlier this year, Sir Christopher Hinton, managing director of the Industrial Group of the U.K. Atomic Energy Authority, referred to the possible value of beryllium metal as a canning material for use in gas-cooled reactors. A further pointer to beryllium's future importance in Britain's nuclear power programme has been given by Sir John Cockcroft, who stated that in the third group of nuclear power stations, it was desired to increase the temperature of the fuel elements from 400 deg. C. to 600 deg. C., thus reducing the capital cost of the power output. This calls for major developments in technology, which are being investigated with promising results. One requirement is to change the fuel elements from a magnesium alloy to beryllium metal, a beryllium alloy, or some other suitable alloy. Beryllium's melting point is nearly twice that of magnesium, which is 650 deg. C.

Using beryllium in the reactor core has the primary advantage of conserving neutrons and giving uniform neutron flux densities. These factors make the reactor core smaller. Another possibility would be to permit the use of natural rather than enriched fuel.

In the U.K. the development and production of beryllium metal has been undertaken by Murex. A pilot plant for the production of beryllium metal is being operated on behalf of the Atomic Energy Authority by the Consolidated Zinc Corporation Ltd., as stated in the chairman's annual review of this company's activities. Small beryllium plants are being operated commercially in France and the U.S.S.R.

The two major producers of beryllium metal, both American, are the Beryilium Corporation, of Pennsylvania, and the Brush Beryllium Co., of Ohio. Mr. W. W. Beaver, director of research at Brush Beryllium, stated at a recent conference that beryllium was of interest to the nuclear programme for a variety of uses rather than just because of one special property. Because of its low thermal neutron absorption cross-section, it can be employed in the manufacture of many different types of reactor hardware. Being the only light metal (its density is slightly higher than that of magnesium) with a relatively high melting point, and having a stiffness modulus greater than that of steel, as well as high specific heat, electrical and thermal conductivity, high strength and modulus at elevated temperatures, and abnormally high sound transmission, beryllium is a metal of great potential usefulness.

Brittleness, or lack of room temperature ductility, is one deterrent factor in using beryllium metal, but some alleviation of this brittleness has been achieved through grain size control, as well as crystal orientation. However, the best properties of the metal are found at high temperatures, up to 1,200 deg. F., and in certain alloy combinations up to 1,500 deg. F.

A number of beryllium compounds have been employed in the U.S. atomic energy programme. Beryllium oxide, like beryllium metal, has good moderating, reflecting and shielding properties. BeO has also been used as a refractory in producing and handling reactor metals, mostly in the production of beryllium itself. Other beryllium compounds used include beryllium nitride, for the production of carbon isotopes; beryllium carbide, as a neutron filter and for experimental testing wherein very high moderation is required; beryllium fluoride, as a low neutron absorbing salt and glass additive; and uranium beryllide, as a potential fuel material.

The chief product of the U.S. beryllium industry has been beryllium-copper alloys. However, the increase in beryl imports from about 6,500 tons in 1955 to over 12,000 tons in 1956, indicates a substantial amount of stockpiling, largely for commercial production of beryllium in quantity during 1957-58. Both the Beryllium Corporation and Brush Beryllium have contracts valued at $23,000,000 from A.E.C. The former company's new beryllium plant at Ashmore, Pa., is scheduled for completion in early August. Its projected output over the first five-year period is set at 250 s.tons of beryllium metal, all of which will be sold in ingot form to A.E.C.

NEW VANADIUM PROJECT

Minerals Engineering Co. is undertaking a joint venture with Rockefeller Centre Inc. and High Speed Steel Alloys Ltd., of the U.K., to set up a vanadium mill in the Transvaal. The mill will have a capacity of 1,800 s.tons of vanadium concentrates annually. The facility is being built by Minerals Engineering Co. of South Africa, in which the three concerns will hold stock. Construction of the mill has already been started and completion is scheduled for early September.

GERMANIUM AND INDIUM FROM GERMANY

The East German news agency, ADN, has reported that a plant for the extraction of scarce metals such as germanium and indium is being set up in Muldenhuetten, near Freiburg. Raw materials will come from nearby mining waste dumps, as well as from deposits in the flues of the VEB Feinzink Freiburg. The plant is scheduled to be completed within the period of the current five-year plan at a total cost of about 10,000,000 East marks.

GALLIUM IN TRANSISTORS

Gallium arsenide and related compounds are being used in new transistors and diodes, which are said to be capable of operating at very high temperatures. Hitherto, the demand for gallium has been very small. The uses of this by-product metal, which has unique properties, would probably increase if larger quantities were available and the price could be brought down.

QUICKSILVER'S FURTHER ADVANCE

The upward movement in London quicksilver prices continues. On June 4, the ex-warehouse price was raised by a further 10s. to £89 per flask. It has now risen by £4 since last March. Supplies of physical metal on the spot are very light indeed and no early relief is yet in sight. Both Spain and Italy are understood to be well committed for some time ahead against orders booked in the world market. Japan and India are still reported to be showing interest. Supplies of Mexican metal are also reported to be getting tighter, and it is rumoured that a good deal of the Mexican production has been going to Japan.

Italian mines produced 301,000 tonnes of mercury ore in 1956, compared with 232,000 tonnes during the preceding year. In the first quarter of 1957 Italy exported 556.4 tonnes of quicksilver against 515.7 tonnes in the corresponding period of 1956. Italian producers have requested the government to cut taxes on quicksilver. These were introduced in 1954 when the world market price was $315 per flask; the present price is about $250.

Quicksilver exports from Yugoslavia during 1956 were slightly over 298 tonnes against 455 tonnes in 1955. This reduction was due mainly to smaller deliveries executed to the U.S., Switzerland and West Germany.

ANTIMONY MARKET QUIET

The general pattern of the free antimony metal market appears to have undergone no material change. In London, Czechoslovakian metal of minimum 99.6 per cent purity is quoted at about £158 per tonne c.i.f. Chinese material is said to be similarly priced. This is equivalent to an ex-wharehouse, London, price of about £178-£179, duty of 10 per cent included. English 99.6 per cent metal remains quoted at £222 10s. per ton delivered and 99 per cent at £210 per ton delivered. These prices have been in force for about 3½ years.

The question of a higher import duty on foreign antimony metal entering the U.K. is still under consideration by the Board of Trade. Meanwhile, sales of English antimony on the domestic market are believed to have shown a little improvement recently.

"ANNUAL REVIEW" ERRORS

In the article on Cobalt which appeared in our Annual Review, 1957 Edition, page 39, it was stated that the

price of cobalt had been reduced on February 1, 1957, to $2.35 per lb., the price to U.K. consumers being at the same time brought down to 19s. per lb. In fact, prices had previously been reduced to these figures and were brought down further on February 1 to the present figures of $2 and 16s. per lb. As is apparent from the context, the wrong figures were also given for the Belgian Congo's cobalt exports, these amounted in 1956 to 14,526 tonnes (12,243 tonnes in 1955).

We are further advised that iron ore deliveries by Cie Minière de Conakry during 1956 amounted to 819,791 tonnes. Steps are being taken to increase production to 2,000,000 tonnes per annum, and this will become effective around the middle of 1958. On page 35 of the Annual Review it was stated that last year's shipments reached 2,000,000 tons.

INDIA'S RADIOACTIVE METALS

Uranium deposits, claimed to be the largest in Asia, have been discovered in Rajasthan Province, North-West India. They are situated in the Bhilwara area, about 130 miles south-west of Jaipur.

Preliminary surveys carried out by the Indian Government have indicated that large new thorium deposits exist in the north-eastern part of India. They are reported to contain more than 3,000,000 tons of ore. The thorium content has been assessed at about 330,000 tons of 10 per cent thorium concentrate. The ores also contain an estimated 10,000 tons of 0.3 - 0.4 per cent uranium concentrate and approximately 80,000,000 tons of ilmenite.

PORTUGUESE TUNGSTEN EXPORTS

During the first quarter of 1957 Portugal exported 609 tonnes of wolfram ores, compared with 934 tonnes in the first quarter of 1956. The situation created by the fall in the world market price is regarded as serious, since only a very few long-term contracts remain to be cleared off. If no improvement takes place, Portugal will be reduced to fewer than six mines in active production.

After remaining unchanged for some ten days, prices in London per l.ton unit c.i.f. Europe fell by 2s. 6d. to 142s. 6d. - 147s. 6d. Buying interest is reported to be quiet.

COPPER · TIN · LEAD · ZINC

(From Our London Metal Exchange Correspondent)

The further decline in zinc has been the most noteworthy feature of the past week, culminating on Tuesday in a ½ c. reduction to 11 c. in the U.S. price. Apart from this metal, London Metal Exchange quotations have shown little change in the general market picture, but, at the same time, trading has been on the quiet side with comparatively low turnovers.

R.S.T. PRODUCTION CUT-BACK

Last week we referred briefly to the agreement which had just been reached between the two main Rhodesian copper-producing groups, Anglo American Corporation of South Africa and the Rhodesian Selection Trust, on a common pricing policy for their sales to U.K. consumers. In the absence of any authoritative details of the scheme until it has been submitted to the consumers—whose approval is necessary—there is naturally a certain amount of speculation in the trade generally as to how it will function, although it is to be hoped that the quotations will have the London Metal Exchange price as a basis. Consumers generally appear to regard the scheme favourably but it seems likely that a certain amount of time will elapse before it can be officially introduced as it will no doubt be necessary for the consumers to have further consultations with the producers. Meanwhile, the R.S.T. Group have announced a 10 per cent cut in production as from the end of last week at their Roan Antelope and Mufulira Mines. It is suggested that this will amount to about 18,000 tons a year and will continue as long as is considered necessary, but unless the Anglo American Group and the large Belgian producer, Union Miniere du Haut Katanga, take similar steps the curtailment will not be sufficient to prevent a continued world surplus of copper, currently estimated at about 130,000 tons yearly. The immediate effect of this announcement on the London market was a 15s. rise in values but this was not maintained after further consideration established the fact that the cut-back represented slightly less than 1 per cent of world production. American producers have already taken action which will result in a cut of about 54,000 tons of copper available for world markets. As against this, the Chilean producers have stated their intention to hold, and possibly raise, their output.

In connection with production cut-backs it is as well to remember that these need not necessarily have any effect on a mine's total output over a longer period; as there is usually scope, at any rate over a short period, for labour to be transferred from direct production on to development work which will facilitate a higher rate of output later on.

Attention must also be drawn to the further widening of the contango on copper in London from about £1 a week ago to the present rate of about £2. This reflects a further increase of 900 tons in refined copper stocks in London Metal Exchange official warehouses for the week ending June 1. Stocks now total 8,447 tons.

In spite of persistent reports and prophecies there has as yet been no cut in the U.S. producer price from the 32 c. level. It had been anticipated in many quarters that with custom smelters selling freely at 2 c. below this figure a reduction would be inevitable and June 1 had been mentioned as a likely date. The export price is now quoted 29½ c.—29¾ c. f.a.s. New York and scrap copper is steady with No. 2 priced at 24½ c.

TIN STEADY

The tin market maintains a steady appearance with consumer demand in Europe reported satisfactory although in America interest can only be described as being on a limited scale. A small backwardation still exists on the London market in spite of a further increase of 80 tons in the stocks of tin in London Metal Exchange warehouses to a total of 1,844 tons. Figures issued during the week show that production of tin in concentrates in Malaya last year reached a post-war record of 62,295 tons. Tin shipments during May from Singapore amounted to 1,832½ tons against 2,094½ tons in April and from Penang 4,326½ tons against 4,332½ tons. On Thursday morning the Eastern price was equivalent to £782 per ton c.i.f. Europe.

LEAD UNAFFECTED BY ZINC

The lead market in contrast to zinc has held up very well and although consumers generally show no inclination to commit themselves more than necessary, both U.K. and Continental consumption is quite satisfactory. In the U.S., mining companies are very critical of the revised barter programme which because of the imposition of various restrictions will only be a fraction of the previous volume. One important restriction is that materials delivered under barter contracts must be produced and processed abroad. This, of course, eliminates lead and zinc ores and concentrates processed at U.S. smelters and refineries which hitherto have played an important part in these deals. The administration's new long-term minerals aid programme is still regarded as inadequate and doubt is expressed that it will achieve anything this year.

As previously indicated the strategic stockpile took in more lead and zinc at the end of May compared to the small tonnages accepted for some months past. It is estimated that the amount of lead purchased was in the region of 7,000 tons or about two and a half times the 3,000 tons a month in recent months. For zinc, the figures were estimated at about 7,000 tons or roughly 40 per cent more than the 5,000 tons a month taken recently.

We have already referred to the ½ c. reduction in the U.S. zinc price which had been expected in many circles as the inevitable result of the disappointing outlook for the barter programme and the continued cautious buying on the part of consumers. This represents a drop of 2½ c. in the New York zinc price in recent weeks as compared to a decline of only 1 c. in the New York lead price. It might be wondered whether—and if so for how long—lead can be maintained at the present 15 c. level although so far there does not appear to have been any real pressure for a reduction. As was to be expected, the backwardation on zinc in London has narrowed to about £1 and might disappear altogether. One cannot foresee, at present, any shortage of zinc concentrates for the European market because the new restrictions in the barter programme will prevent these from being shipped to and smelted in the U.S. and the metal delivered against barter sales.

Closing prices and turnovers are given in the table overleaf.

LONDON METAL AND ORE PRICES, JUNE 6, 1957

THE WEEK ON THE L.M.E

	May 30 Buyers	May 30 Sellers	June 6 Buyers	June 6 Sellers
Copper				
Cash	£235½	£236	£233½	£233½
Three months	£236½	£237	£235½	£235½
Settlement	£236		£233½	
Week's turnover	5,025 tons		5,475 tons	
Lead				
Current ½ month	£96½	£97	£93½	£93½
Three months	£97½	£97½	£93½	£94
Week's turnover	2,875 tons		3,050 tons	
Tin				
Cash	£763½	£764	£763	£763½
Three months	£761½	£762	£760	£760½
Settlement	£764		£763½	
Week's turnover	410 tons		1,255 tons	
Zinc				
Current ½ month	£81	£81½	£76½	£76½
Three months	£79½	£79½	£75½	£76
Week's turnover	6,175 tons		8,000 tons	

METAL PRICES

Aluminium, 99.5%, £197 per ton

Antimony —
English (99%) delivered, 10 cwt. and over £210 per ton
Crude (70%) £200 per ton
Ore (60%) bases 23s. 6d./24s. 6d. nom. per unit, c.i.f.

Arsenic, £400 per ton

Bismuth (min. 1 ton lots) 16s. lb. nom.

Cadmium 12s. 0d. lb.

Cerium (99% nett), £13 18s. lb. delivered U.K.

Chromium, Cr. 99% 7s. 2d. lb.

Cobalt, 16s.-19s. lb.

ORES AND OXIDES

Bismuth .. .. 65% 8s. 6d. lb. c.i.f. 30% 5s. 6d. lb. c.i.f.

Chrome Ore—
Rhodesian Metallurgical (semifriable) 48% .. .. £17 8s. 0d. per ton c.i.f.
,, Hard Lumpy (45%) .. .. £17 8s. 0d. per ton c.i.f.
,, Refractory 40% .. .. £12 15s. 0d. per ton c.i.f
,, Smalls 42% .. .. £16 5s. 0d. per ton c.i.f.
Baluchistan 48% .. .. £12 0s. 0d. per ton f.o.b.
Columbite, 65% combined oxides, high grade .. .. 185s./197s. 6d. per unit
Fluorspar—
Acid Grade, Flotated Material .. .. £22 13s. 3d. per ton ex. works
Metallurgical (75/80% Ca F_2) .. .. 156s. 0d. ex. works

Lithium Ore—
Petalite min. 3½% Li_2O .. .. £8-£10 per ton f.o.b. Beira
Lepidolite min. 3½% Li_2O .. .. £8-£10 per ton f.o.b. Beira
Amblygonite basis 7% Li_2O .. .. £28-£32 per ton f.o.b. Beira
Magnesite, ground calcined .. .. £28 0s./£30 0s. d/d
Magnesite Raw (ground) .. .. £21 0s./£22 0s. d/d
Molybdenite (85% basis) .. .. 8s. 5d. nom. per lb. (f.o.b.)

Titanium Ore —
Rutile 95/97% TiO_2 (prompt delivery) .. .. £59/£62 per ton c.i.f. Aust'n
Ilmenite 52/54% TiO_2 .. .. £11 10s. per ton c.i.f. Malayan
Wolfram and Scheelite (65%) .. .. 142s. 6d./147s. 6d. per unit c.i.f.

Manganese Ore Indian
Europe (46%-48%) basis 130s. freight plus 5% surcharge .. .. .. 131d nom. per unit c.i.f.
Manganese Ore (43%-45%) .. .. 106d. nom. per unit. c.i.f.
Manganese Ore (38%-40%) .. .. 100d. nom. per unit. (including duty)

Vanadium —
Fused oxide 90-95% V_2O_5) .. .. £12½-£13½ per unit c.i.f.
Zircon Sand (Australian) (65-66% ZrO_2) .. .. £20 per ton c.i.f.

Germanium, 99.99%, Ge. kilo lots 3s. 4d. per gram

Gold, 251s. 2½d.

Iridium, £27/29 oz. nom.

Lanthanum (98/99%) 15s. per gram

Manganese Metal (96%-98%) £310

Magnesium, 2s. 5½d. lb.

Nickel, 99.5% (home trade) £600 per ton

Osmium, £20/22 oz. nom.

Osmiridium, nom.

Palladium, £8 0s./£8 10s. oz.

Platinum U.K. and Empire Refined £32½/£32¾ oz.
Imported £32½/£32¾ nom.

Quicksilver, £91 10s. ex-warehouse

Rhodium, £42 oz.

Ruthenium, £15/£17 oz. nom.

Selenium, 75s. nom. per lb.

Silver, 78½d. f. oz. spot and 78¼d. f'd.

Tellurium, 15s./16s. lb.

LONDON STOCK EXCHANGE PRICES, JUNE 5, 1957

Finance	Price June 5	+ or — on week
African & European	53/9	+1/3
Anglo American Corpn.	6⅞	+⅛
Anglo-French	22/6	.....
Anglo-Transvaal Cons.	27/6	.....
Central Mining (£1 shrs)	66/3	—4½
Consolidated G'fields	52/9	+1/6
Consol. Mines Selection	30/-	.....
East Rand Consols	1/9	.....
General Mining	55/-	+3/1½
H. E. Prop.	8/1½	+3d
Johnnies	42/-	+1/4½
Rand Mines	67/6	—2/6
Rand Selection	34/4½	+1/3
Union Corporation	37/9	+1/6
Vereeniging Estates	4⅛	—⅛
Writs	37/6	+2/3
West Wits.	31/-	+1/-
Rand Gold		
Blyvoors	19/9	+9d
Brakpan	4/10½	.....
Buffelsfontein	31/6	+1/6
City Deep	12/-	+3d
Consol. Main Reef	13/1½	.....
Crown	22/6	—6d
Daggas	30/7½	+3d
Dominion Reefs	16/4½	.....
Doornfontein	22/-	+2/3
Durban Deep	22/-	—3d
E. Champs	2/6	.....
E. Daggas	7/6	.....
E. Geduld (4s. units)	26/6	+6d
E. Rand Props.	37/6	+9d
Geduld	67/6	+2/6
Govt. Areas	3/6	.....
Grootvlei	15/-	.....
Hartebeestfontein	50/6	+4/-
Libanon	6/6	+6d
Luipaards Vlei	13/-	.....
Marievale	17/7½	+3d
New Kleinfontein	3/3	.....
New Pioneer	19/4½	+1/9
Randfontein	32/-	+2/-
Robinson Deep	7/3	.....
Rose Deep	8/6	.....
Simmer & Jack	3/7½	+1½d
S.A. Lands	22/6	.....
Springs	1/10½	.....
Stilfontein	27/-	+1/3
Sub Nigel	17/4½	+4½d
Vaal Reefs	31/3	+1/4½
Van Dyk	3/-	.....
Venterspost	12/4½	+7½d
Vlakfontein	14/6	+9d
Vogelstruisbult	12/6	.....
West Driefontein	4½	+⅛
Rand Gold contd.		
W. Rand Consolidated	30/3	+6d
Western Reefs	27/1½	+3d
O.F.S. Gold		
Freddies	4/9	+1½d
Freddies Consolidated	3/6	+1½d
F.S. Geduld	61/10½	+4/4½
Geoffries	3/-	+4½d
Harmony	21/9	+2/6
Loraine	3/10½	.....
Lydenburg Estates	12/6	+1/3
Merriespruit	4/-	.....
Middle Wits	9/3	+1/-
Ofsits	49/3	+2/9
President Brand	49/-	+3/-
President Steyn	25/9	+2/-
St. Helena	23/-	+1/3
Virginia Ord.	9/9	.....
Welkom	15/3	+9d
Western Holdings	63/1½	+4/4½
West African Gold		
Amalgamated Banket	11½d	.....
Ariston	4/-	+1½d
Ashanti	20/4½	—4½d
Bibiani	2/7½	.....
Bremang	1/3	.....
Ghana M.R.	1/9½	—½d
Konongo	1/4½	—1½d
Marlu	½d	.....
Taquah	4½d	.....
Western Selection	5/1½	.....
Australian Gold		
Gold Mines of Kalgoorlie	12/9	.....
Great Boulder Prop.	12/4½	+1½d
Lake View & Star	19/-	—4½d
Mount Morgan	13/-	+3d
North Kalgurli	7/-	—6d
Sons of Gwalia	1/9	.....
Western Mining	9/-	—1½d
Miscellaneous Gold		
Cam & Motor	8/-	.....
Champion Reef	6d	.....
Falcon Mines	7/9	.....
Globe & Phoenix	24/6	.....
Motapa	10½d	.....
Mysore	3d	.....
Nundydroog	6d	.....
St. John d'el Rey	48/9	—7/3
Zams	53/9	—7½d
Diamonds and Platinum		
Anglo American Inv.	8⅜	—⅛
Casts.	27/6	—1½d
Cons. Diam. Pref. of S.W.A.	10/9	.....
De Beers Defd. Regd.	4⅜	.....
De Beers Pfd. Regd.	13½	.....
Pots. Platinum	14/10½	.....
Waterval	25/-	—3d
Copper		
Bancroft	35/6	—9d
Chartered	70/6	.....
Esperanza	2/6	+1½d
Magundi	8/7½	+1½d
Messina	8⅜	—⅛
Nchanga	11⅛	—⅛
Rhod. Anglo-American	91/3	—9d
Rhod. Katanga	33/6	—6d
Rhodesian Selection	19/6	—9d
Rhokana	36	.....
Rio Tinto	4⅛	—⅛
Roan Antelope	10/9	—3d
Selection Trust	5⅜	+⅛
Tanks	8⅜	+⅛
Tharsis Sulphur Rr.	4½	.....
Tin (Eastern)		
Ayer Hitam	25/3	+3d
Gopeng	17/-	—3d
Hongkong	6/7½	.....
Ipoh	16/6	.....
Kamunting	12/-	+3d
Kepong Dredging	4/6	+3d
Kinta Tin Mines	28/6	+3d
Malayan Dredging	16/10½	.....
Pahang	17/7½	+6d
Pengkalen	19/-	—6d
Petaling	6/10½	+4½d
Rambutan	20/-	.....
Siamese Tin	15/1½	—3d
Southern Kinta	21/3	—1½d
S. Malayan	11/6	—3d
S. Tronoh	9/7½	+6d
Sungei Kinta	22/3	.....
Tekka Taiping	9/6	.....
Tronoh	14/3	.....
Tin (Nigerian and Miscellaneous)		
Amalgamated Tin	10/7½	—4½d
Beralt Tin	46/-	—1/6
Buichi	4/4½	—4½d
British Tin Inv.	25/6	+6d
Ex-Lands Nigeria	2/4½	—1½d
Geevor Tin	18/-	+9d
Tin (Nigerian and Miscellaneous) contd.		
Gold & Base Metal	1/7½	.....
Jantar Nigeria	4/-	—4½d
Jos Tin Area	15/3	.....
Kaduna Prospectors	2/-	.....
Kaduna Syndicate	2/6	.....
London Tin	12/4½	+1½d
United Tin	10½d	.....
Silver, Lead, Zinc		
Broken Hill South	71/3	+9d
Burma Mines	3/4½	—1½d
Consol. Zinc	74/-	—4/9
Lake George	8/-	—3d
Mount Isa	27/6	—3d
New Broken Hill	47/9	—3d
North Broken Hill	5½	.....
Rhodesian Broken Hill	10/9	—1½d
San Francisco Mines	24/3	—9d
Uruwira	3/-	—1½d
Miscellaneous		
Base Metals and Coal		
Amal. Collieries of S.A.	2⅜	.....
Associated Manganese	40/3	—3d
Cape Asbestos	11/10½	+4½d
C.P. Manganese	23/-	—9d
Consol. Murchison	48/9	.....
Natal Navigation	3⅜	.....
Turner & Newall	137/6	+3/-
Wankie	18/1½	—1½d
Witbank Colliery	5¼	.....
Canadian Mines		
Dome	$26	.....
Hollinger	$72	+7½
Hudson Bay Mining	$132½	—1½
International Nickel	$217	+2
Mining Corpn. of Canada	£6½	—¼
Noranda	$102	—1
Quemont	£5½	+¼
Yukon	6/6	+1/7½
Oil		
Apex	62/9	+3/-
Attock	50/3	—1/3
British Petroleum	165/-	+1/10½
Burmah	112/6	—1/3
Canadian Eagle	83/9	—6d
Mexican Eagle	20/6	—1½d
Shell	195/-	+2/1½
T.P.D.	94/4½	+2/6
Ultramar	72/9	—1/-

Mining Finance

Kaffir Market Behaving Well

Holiday influences and the Derby are the two factors which may explain the quiet conditions this week on the London Stock Exchange. On the other hand, it may well be that unless and until the pace of industrial activity is markedly stepped up, "industrials" are in for a quiet time over the next few months at least.

The general quietus on the Stock Exchange has not, however, spilled over into the Kaffir market and South African gold shares are behaving very well indeed. A fillip to the gold share market is the excellent May returns and the encouraging news retailed by chairmen in their annual statements. Free-Staters and Far Westerns as usual claimed most attention and these issues have gone shillings better this week.

Mining finance houses have been well supported with the exception of Central Mining which could be in for a sharp fall if no word is forthcoming from Mr. Glazer. Lead-zincs are weak on the lower price of the metal but copper is holding fairly well despite the easier trend in the metal price. Tins, though quiet, are managing to maintain recent gains.

Elsewhere, St. John D'el Rey has tumbled several points following the statement that operating losses are in the neighbourhood of £50,000 a month, and if the mine closes the indemnity payable to the company's labour force may be as much as £3,000,000 or £4,000,000. An interesting aspect of the present situation is that the company has granted an option for a one-year period to a Doctor Lins to purchase 75,000 of the unissued ordinary shares at a price of 50s. per share. This reminds one of Dr. Braun's intervention at Dominion Reefs (Klerksdorp) and it can only be hoped that Dr. Lins will be as successful.

F.S.G.'s OUTSTANDING RETURN

Free State Geduld increased its working profits by almost £41,000 to the new high level of £211,000. The advance in earnings augers well for the future and was achieved as a result of a rise in the milling grade from 11.32 dwt. gold per ton in April to 12.34 dwt. last month. This enabled the increase in working costs of 6d. to 79s. 3d. per ton to be more than offset. It may be recalled that this company's profits were only in the region of £100,000 in December last year. Western Holdings, President Brand, Brakpan and Daggafontein were others in the Anglo group to announce good returns.

In the General Mining group, Buffelsfontein was the feature with a rise of £23,000 over the previous month. An aspect of this group's returns was the release for the first time of monthly uranium profits earned by Stilfontein and Ellaton.

Blyvoors, Harmony and E.R.P.M. in the Central Mining group showed marked profit advances last month, as did Grootvlei and East Geduld in the Union Corporation group. Hartebeestfontein, in the Anglo-Transvaal group, returned a working profit from gold and uranium of over £500,000, thereby placing this company second only to West Driefontein in monthly working profits. West Driefontein again recorded excellent profits and that from Doornfontein, also in the Gold Fields group, showed a record monthly crushing and peak profits from gold and uranium operations.

The May returns were based on the gold price of 249s. 9d. per oz., against 249s. 10d. in April.

DIAMOND DEMAND UNABATED

The demand for diamonds both gem and industrial in the first five months of this year has continued unabated, Mr. Harry Oppenheimer declared at the De Beers annual meeting earlier this week.

During the first five months of the current year sales of gem diamonds amounted to £21,046,000 compared with £20,465,000 in the first five months of 1956. In the case of industrial diamonds, sales during the same period of this year were £10,418,000 against £8,758,000 over the similar period last year.

While sales of industrial diamonds have been fully maintained, Mr. Oppenheimer said it was, nevertheless, anticipated that the end of stockpiling by the United States would lead to decreased sales of industrial stones for the current year.

UNION CORPORATION'S INTEREST IN THE BETHAL AREA

Viscount Bracken, chairman of Union Corporation, at the annual meeting held in Johannesburg on May 28 stated that the U.K. Finance Bill in its original form did not provide any material benefit to the Corporation. However, amendments to the Bill now being debated may give some relief from the present burden of U.K. taxation.

With regard to the Kinross area in the Far Eastern Rand where the company is developing the Winkelhaak Mine, the chairman said that approximately 10,000 morgen, equivalent to 14,000 mining claims forming a compact block, had been subjected to drilling with satisfactory—and indeed in some places—most encouraging results. Work in this area is still proceeding.

Other points of interest was the chairman's disclosure that at Winkelhaak, underground development and the erection of a reduction plant with a capacity of 60,000 tons a month were both expected to be sufficiently well advanced to enable trial crushing to begin in about a year. At St. Helena good progress had been made in the sinking of the No. 2 shaft; and Van Dyk was expected to materially increase its profits over its remaining limited life. The question of a cash distribution to members would be examined some time this month.

SORTING AT STILFONTEIN

The chairman's statement for Stilfontein Gold Mining Company, presented to shareholders in Johannesburg on Friday, May 24, makes good reading as can be confirmed by turning to page 731 where the address is published in full.

Of particular interest to shareholders is the greater degree of sorting last year, a development made possible by the fact that values in this mine lie within a channel width of less than 6 in. For 1956, the percentage waste sorted on surface increased to 24.1 per cent as compared with 20.5 per cent in 1955. This resulted in the recovery grades of both gold and uranium being appreciably enhanced and, during the first four months of 1957, surface sorting has risen to 28 per cent.

During the first four months of the current year development results have been maintained at a very high level and of 6,350 ft. sampled 92.4 per cent proved payable giving an average value of 458 in. dwt. Capital expenditure during 1957 is estimated at about £800,000 mainly on the provision of an additional winder at the Margaret Shaft.

Referring to the company's loan commitments the chairman pointed out that short-term liabilities were at present limited to the amount outstanding on Loan Stock which will be reduced by July 1 next to a balance of £226,807 repayable within one year thereafter. So soon as an official proclamation of the relative township has been made the company will proceed to complete its mortgage loan programme so as to leave the way clear for the more generous dividend policy which should now be possible as a result of increasing profits from the mine and the all but final completion of the long and arduous programme of short-term loan redemption.

GLOBE AND PHOENIX AN O.T.C.

Mr. Alexander Macquisten, chairman of the Globe and Phoenix Gold Mining Company, does not mince words in his statement to shareholders on the subject of taxation.

Hearking back to 1939, he points out that the total mulctings by way of direct taxation by the U.K. and Southern Rhodesian Governments took approximately 17s. in the £ of the company's profits. In 1952, the Rhodesian Government, perhaps realizing, he said, the damage their taxation system was wreaking on the mining industry, brought in an Act conceding a 10 per cent depletion allowance. The U.K. tax authorities, however, disallowed this allowance and appropriated the saving meant for the company.

This high-handed action was then neatly countered by the Rhodesian Government amending their legislation retroactively so that the 10 per cent de-

pletion allowance would only accrue to any company provided that, if they were subject to taxation in another country, this depletion allowance would also be conceded. Flying in the face of commonsense the British Government refused to concede the allowance with the result that the company paid £120,000 more taxation in Rhodesia because of the U.K. Government's refusal to co-operate. "The absurd result," the chairman stated, "was that they did not get it—nor did we."

However, the Chancellor's recognition of Overseas Trade Corporations should now eliminate past injustices and place the company—at last—on an equal footing with other mining concerns operating in Southern Rhodesia but who are registered in the U.K. While the effect of the recognition of O.T.C.s is not as yet ascertainable in so far as Globe and Phoenix is concerned, the chairman's view is that, "it should make a considerable difference to our advantage".

FINANCIAL NEWS AND RESULTS IN BRIEF

Mount Isa's Arrangement With Zinc Corp.—Mount Isa Mines has entered into an arrangement with Zinc Corporation for joint examination of the mineral possibilities of certain portions of Queensland and the Northern Territory and that this work is in progress. Areas which were held by either company in the portions of Queensland and the Northern Territory are excluded from the joint examination.

Henderson's Transvaal Estates.—The dividend of Henderson's Transvaal Estates for the year ending March 31, 1957, remains unchanged at 15 per cent, absorbing £48,599. Group profit for the year after all charges, including taxation, amounted to £127,983. The meeting will be held on July 30.

Decline in Tronoh's Profits.—In the year ended December 31, 1956, Tronoh Mines earned a profit of £379,413 after tax, against £430,370 in 1955. The dividend recommended, however, remains unchanged at 47½ per cent. Southern Tronoh's preliminary figures issued simultaneously with those for Tronoh show a similar decline in profits from £89,176 to £79,310, their dividend also remaining at the 1955 figure of 27½ per cent. Both meetings will take place on July 11.

Less From Puket.—Preliminary figures for 1956 from Puket Tin Dredging reveal profits after tax almost £7,000 lower at £66,801, in spite of a drop in U.K. tax from £102,462 to £59,360. The dividend recommended is 30 per cent, absorbing £30,188, against 37½ per cent in 1955. Meeting, July 10.

Ampat Tin Dredging.—At £80,134 Ampats' profits after tax were fractionally higher than in 1955. A final dividend of 37½ per cent (same) is recommended absorbing £53,906, making a total of 55 per cent for the year. £96,817 is carried forward. Meeting, June 25. Chairman, Mr. J. Ivan Spens, O.B.E.

Tweefontein Colliery.—Tweefontein's profit after tax for the year ending March 31, 1957, is estimated at £16,860, an increase of almost £7,000 over 1956, the increase being accounted for by a change in the dates of payment of dividends by Tweefontein United Collieries. Tweefontein Collieries' own dividend remains at 17½ per cent absorbing £6,038. Taxation for the year amounted to £13,066, and £13,000 was transferred to General Reserve. Meeting, July 30.

Flooding Strains Uruwira's Resources.—Uruwira Minerals, where recent flooding of the 6th and 7th levels of the mine took place, now announce that de-watering and repair and re-installation of essential equipment is proceeding satisfactorily and limited production has been resumed. Full production, however, cannot be expected for some weeks. The consequent loss of revenue to the company by the flooding, coupled with the run of low-grade ore that was being mined prior to the mishap, is placing a severe strain on the company's financial resources.

Trepca Liquidates.—As a result of the resolutions passed at Monday's E.G.M., Trepca Mines is now in voluntary liquidation. The liquidator announces that it may be some time before the first distribution can be made.

New Vaal Farms Capital Reconstruction.—New Vaal Farms will hold an extraordinary meeting on June 26 to discuss proposals for reorganizing the company's capital. The reconstruction scheme has as its objects both the simplification of the present capital structure and the provision of additional working capital to meet the company's expansion plans. The proposals include *inter alia* the conversion of the £114,429 debenture stock (all held within the New Union Goldfields group) into 10s. shares, the writing down of the resultant total of 397,740 shares by 5s., and the issue of a further 402,260 shares to be taken up by N.U.G. and New Union General Industries. The net result will be the paying off of the unsecured loans and accumulated losses and the provision of about £20,000 new working capital.

Sales Record by B.I.C.C.—An attractive annual report from B.I.C.C. reveals that 1956 group sales to outside customers established a new record at £129,000,000—£10,000,000 more than in 1955. Of this, overseas business accounted for some 36 per cent against 33 per cent in the previous year. Capital expenditure was again heavy at almost £6,000,000 and Mr. W. H. McFadzean, the chairman, extracts from whose circulated statement appears on page 733, indicates that a further £9,000,000 will be spent during the next three years, exclusive of normal replacements. Net group profit for the year declined to £3,715,631 (£4,501,532 in 1955) but the final dividend is maintained at 8½ per cent, making 12½ per cent for the year (same). The balance carried forward is £5,376,188. Meeting, London, June 25.

Golden Horse Shoe Distribution.—The Liquidator of The Golden Horse Shoe (New) Limited announces that a First Cash Distribution of 1s. 3d. per share will be made on June 24, 1957.

S.W.A. Co. Share Split.—The South West Africa Company announce that following approval of the sub-division of their shares into 3s. 4d. units, new share certificates will be available from June 7.

STILFONTEIN GOLD MINING COMPANY LIMITED

(Incorporated in the Union of South Africa)

The Eighth Annual General Meeting of Members was held in Johannesburg on Friday, May 24, 1957, and in the course of his speech the Chairman said :—

The Report and Accounts which are before you show that the satisfactory progress of the last few years was maintained during the year under review.

There was an increase in the tons milled of 70,000 tons during the year and the yield per ton rose from 7.858 dwts. to 7.944 dwts. The working profit from gold, including the additional revenue from gold advantageously disposed of, increased by £98,485, to which must be added an increase in the working profit from uranium and sulphuric acid of £296,956, so that in total the working profit increased by £395,441 to the figure of £3,332,282 reflected in the accounts. Additional income included amortization contributions from other participants in the Joint Uranium Scheme amounting to £241,206 and a surplus of £100,500 resulting from the sale of your Company's holding of Hartebeestfontein shares acquired some years ago, against the relinquishment of an area of 300 claims, as then explained to you. Interest and sundry expenses accounted for £326,312 leaving a net profit of £3,353,544, an improvement of £505,849 on the previous year.

Working Costs increased by 2s. 7d. per ton, rather more than half of which is accounted for by increased European wages, resulting from the wage determination in November, 1955, and increased Pneumoconiosis costs which became effective from August, 1956, and will in a full year be equivalent to 5d. per ton. The balance is attributable to a variety of causes, including rises in commodity costs and sundry charges and the fact that in this year working costs have, for the first time, borne the full burden of expenditure on excess development with the exception of an amount of £11,000 capitalized in the earlier months of the year.

A further factor affecting working costs, when measured in terms of tonnage milled, is the high degree of sorting made possible by the fact that the values in this mine lie within a channel width of less than 6 in. Improvements in sorting technique are being continuously effected with the result that during 1956 the percentage waste sorted on surface increased to 24.1 per cent as compared with 20.5 per cent in 1955.

The recovery grades of both gold and uranium have been appreciably enhanced by this increase in sorting, with resultant improvements in profit as reflected in the results for the first four months of 1957. During this period the surface sorting has averaged 28 per cent and the working profit from gold amounted to £1,001,055, which is approximately £200,000 higher than the corresponding period last year. The profit from the production of uranium and acid for the first quarter of 1957 was estimated to be £214,001 which represents an improvement of £37,844 over the similar period last year.

As will be seen from the Consulting Engineer's Report, the development results in 1956 showed considerable improvement over those of the previous year with regard to both payability and value. These improved results were reflected in a further increase in the average value of the ore reserves, which at the year end stood at 4,286,000 tons, with an average value of 9.59 dwt. per ton over an estimated stoping width of 38.1 in., equivalent to 365 in. dwt. This represents an increase of 780,000 tons and an improvement of .92 dwt. per ton as compared with the previous year. During the current year these encouraging development values have been maintained and in the first four months 6,350 ft. have been sampled with 92.4 per cent payability and an average value of 458 in. dwt.

The favourable trend in development values has continued during the current month and I have some up to the minute particulars in regard to gold values. The total footage sampled from January 1 to date has been 7,370 ft. with 92.3 per cent payability and average value of 109.3 dwt. per ton over 4.3 in., equivalent to 470 in. dwts.

For the first time it is permissible at an annual meeting to discuss uranium values. Our Ore Reserves are computed in terms of their payability for gold, but the tonnages above reported also included uranium of the average value of 11.58 in. lbs. The development for the first four months of the current year above referred to also reflects an improvement in uranium content, the average value being 15.85 in. lb. Uranium and acid production have contributed significantly to the profits of the year and may be expected to continue to do so during the contract period.

Capital expenditure for the year related to gold production totalled £977,754, as compared with the estimate of £1,000,000 which I placed before you at the last meeting. The largest individual item was concerned with the deepening of the Margaret shaft by 365 ft. to the 15 level, at which point sinking was suspended temporarily. A loading box was cut below 14 level and ore and waste passes were developed between 10 and 14 levels. This will enable a considerable amount of development to be completed for the exploitation of the area between 10 and 14 levels before the resumption in 1958 of sinking to the final depth of the shaft. The expenditure for the year also included costs of the extension of two sub-incline shafts and various minor items. It is estimated that the capital expenditure during 1957 will be about £800,000 mainly on the provision of an additional winder at the Margaret shaft, the erection of further European housing and the necessary purchase of the freehold title to a portion of the surface of the lease area occupied by surface installations.

All the capital expenditure above discussed is related to the production of gold. There was in addition expenditure during the year to the extent of £159,425 in connection with the uranium and acid plants (mainly related to the extension of the acid plant) all financed from the relative loans, and loan funds to the extent of £176,709 were carried forward to cover similar expenditure during the current year.

The Company's loan commitments, which have figured prominently in the Accounts for the past few years, have, as I forecast in my report at the last Annual Meeting, been substantially reduced both during and since the close of the year. Our short-term commitments are in fact at this moment limited to the amount outstanding on Loan Stock which amount will, in terms of the Deed Poll, be reduced by July 1 of this year to a balance of £226,807 repayable within one year thereafter. It had always been our policy to provide a portion of the funds required for short-term loan redemption by means of long-term mortgage loans on existing housing up to a total of £1,000,000 of which £500,000 has already been borrowed, as reflected in the accounts. Delays in proclamation of the relative township have made it necessary for us to effect these various loan repayments out of current resources. On proclamation, which is expected in the near future, we shall proceed to complete the mortgage loan programme so as to leave the way clear for the more generous dividend policy which should now be possible as a result of increasing profits from the mine and the all but final completion of the long and arduous programmes of short-term loan redemption.

As regards the uranium and acid loans you will see that the amount outstanding has been reduced by £344,531 during the year. This reduction was effected in the normal way in terms of the loan agreements.

I have, broadly speaking, now dealt with progress at the mine and the general finances of the Company, but before concluding I would like to refer briefly to certain other interests and activities of your Company which have been undertaken as ancillary to its mining activities.

The Stilfontein Township of which the owners for their respective areas are your Company, its two sister mines in the Lucas Block and New Pioneer, is reaching a significant stage in its development. The problems of providing native townships, cemetery and sewage disposal sites have now been successfully dealt with and this Company will be called on to meet its share of the costs of this land at a comparatively small cost.

Up to the present the four township owners have between them provided the capital cost of all the service installations in the township and have run these services at cost for the benefit of the residents in the township. It is felt that the time has now arrived to examine the possibilities of handing over these service installations in the township to the Local Authority. Despite the proposed conditions of establishment of the townships it is anticipated that the owners may have to assist in the provision of certain amenities such as tarred roads and stormwater drains, but in turn they should obtain a refund of the depreciated value of their capital expenditure on electrical and sewage installations. It is hoped to finalise this matter during the course of the next few months after all the portions of the township involved are proclaimed.

The Duff Scott Memorial Native Hospital, which provides hospital facilities for the Native labour of Stilfontein and the other two participants, Hartebeestfontein Gold Mining Company Limited and Buffelsfontein Gold Mining Company Limited, was completed during the year, with a capacity of 342 beds. A 200-bed extension to the hospital is now nearing completion. This extension includes a 60-bed isolation ward and additional convalescent facilities. Your Company owns one-third of the land, buildings and equipment and will continue to contribute accordingly to the costs of this venture.

This concludes my review of the affairs of the Company.

THE CONSOLIDATED ZINC CORPORATION

PLANS FOR FUTURE DEVELOPMENT

The eighth annual general meeting of The Consolidated Zinc Corporation Limited will be held on June 26 at 37, Dover Street, London, W.1. The following are extracts from the Statement of the Chairman, **Mr. L. B. Robinson :—**

The Trading Balance for 1956 of £6,250,323 was lower than the previous year by £187,532, the decrease being wholly due to the effect on the group's activities in the United Kingdom of the deterioration of trading conditions in this country.

The profits from our subsidiaries operating in Australia showed little change from the previous year.

The consolidated net profit for the year at £2,044,383 is £300,545 lower than 1955.

Transfers of £800,000 have been made to general reserves.

It is proposed that the final dividend should be at the same rate as last year, namely 3s. per share, thus maintaining the same total for the year of 4s. 6d. per share.

Production

The Zinc Corporation Mine at Broken Hill and that of New Broken Hill Consolidated showed a further expansion in ore production with a continued increase in mining efficiency.

The ore reserves of both mines were fully maintained by development work during the year.

The production of metal from the zinc plants of Imperial Smelting Corporation in the United Kingdom was maintained at virtually the same level.

The new plant for the production of "Isceon", the registered name for a group of fluorine-based refrigerants and aerosol propellants, came into operation in January, 1957.

In December last we announced the formation of the Commonwealth Aluminium Corporation to undertake the further investigation and planning for the development of the deposits of bauxite discovered on the West Coast of Cape York Peninsula.

Lead and Zinc Markets

During the past year the operations of the U.S. Stockpile have dominated both markets. The setback in zinc consumption in the U.S.A. due to the mid-summer steel strike and the falling off in automobile production, coupled with a sharp down-turn in U.K. car production, caused deliveries to the Stockpile to reach very large tonnages. We have, therefore, constantly before us the problems that would emerge if there should be a change in U.S. official policy. There is little doubt that current production, particularly of zinc, would be more than industry could immediately absorb, even if a return to the 1955 rate of consumption were to take place. We believe, however, that whilst the underlying tendency of world inflation continues and determined efforts are being pursued to raise the living standards of undeveloped countries, the position should in due course again be in balance. There may, however, be a period when this lack of balance will adversely affect metal prices and we must be prepared for the consequences. This situation is not a new one and has been faced successfully by the group in the past and we are therefore justified in facing the future with quiet confidence.

In looking to the future it must be borne in mind that our main source of income will for several years ahead be derived from our present interests in lead and zinc production in Australia and the United Kingdom. It must clearly be some time before the new projects can be developed to a revenue earning stage and our activities are more widely based. In the meantime, our cash resources place us in a strong position to face any vagaries in the markets for our present products and to insure the uninterrupted progress of our plans.

NEW BROKEN HILL CONSOLIDATED

RECORD ORE PRODUCTION

The 21st annual general meeting of New Broken Hill Consolidated Limited will be held on June 26 in London.

The Chairman, **Mr. L. B. Robinson,** prefaced his circulated statement, from which extracts are set out below, with a tribute to the late Chairman, Mr. J. R. Govett.

The results for 1956 show a profit before taxation of £1,991,129, compared with £1,850,449 for 1955, an increase of £140,680.

Production of ore reached a record figure and although the average grade of ore was lower than in 1955 the production of recoverable lead in lead concentrates was higher. The tonnage of lead realized in 1956 was higher than in the previous year but, due to the incidence of shipping, was 91 per cent. of the production compared with 98 per cent. for 1955. The average realized prices for lead and zinc concentrates were higher than for 1955, but ocean freights were also considerably higher and absorbed much of the increased revenue from sales. The cost per ton of ore at Broken Hill—including milling cost—increased by approximately seven per cent. which was almost entirely accounted for by an increase in the charge to revenue for mine development and an increase in production from square-set stopes.

The charge for taxation was much higher in 1956 and amounted to £1,116,600 compared with £903,386 for 1955. It is too soon to assess accurately the benefit which the company should derive from the provisions of the Finance Bill 1957, but, from an examination of the Bill as published, it appears that the company should qualify as an Overseas Trade Corporation. Due to the heavy taxation charge the net profit for the year, at £874,529, is £72,534 lower than for 1955. A transfer has been made to General Reserve of £150,000 compared with £300,000 for 1955. It is proposed that a final dividend of 3s. per share be paid, compared with 2s. 6d. per share for 1955, giving a total distribution for the year of 5s. per share compared with 4s. 6d. per share for 1955.

Production

Ore production from the Company's leases in 1956 totalled 606,325 tons (lead averaging 8.7%, silver 2.2 ozs., and zinc 12.9%) compared with 531,447 tons in 1955 lead 8.9%, silver 2.0 ozs. and zinc 13.8%), an average of 2,516 tons of crude ore per day, as against 2,252 tons per day for 1955.

Realizations as compared with 1955 were as follows : recoverable lead 44,044 tons (41,914); silver 988,731 ounces (787,030); zinc concentrate 124,191 tons (117,811).

Total ore reserves fully outlined and developed ready for stoping or in the process of being stoped, as at December 31, 1956 are calculated at 3,200,000 tons assaying lead 10.7%, silver 2.7 ozs., and zinc 10.7% compared with 3,000,000 tons assaying lead 11.0%, silver 2.7 ozs., and zinc 12.0% at December 31, 1955.

After reviewing the major items of development and drilling, the Chairman concluded: The increase in the output of the Mine to 606,000 tons as compared with the target figure of 540,000 tons is wholly attributable to the continued improvement in operating efficiencies, and this could not have come about without sustained effort and effective co-operation on the part of all concerned.

Publications Received

The March-April, 1957, issue of *Economic Geology* contains *inter alia* papers on "Critical Factors in Finding Hypogene Orebodies," "Mineralogy of the Lone Eagle Uranium-Bearing Mine, Montana", "Intergrowths of Pentlandite and Pyrrhotite". "Davidites from the Mt. Isa-Cloncurry District, Queensland", and "The Burnt Hill Wolframite Deposit, New Brunswick, Canada".

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A statistical review of the mineral industry of 1955 has been issued by the Ontario Department of Mines, Toronto, as Vol. LXV, Part 1, 1956. Other subjects covered by this publication are mining accidents in 1955 and classes for prospectors, 1955-56.

★

A preliminary survey, *Atomic Energy Applications with Reference to Under-developed Countries,* has been published for Resources for the Future by the John Hopkins Press (Price $2). The aim is to present a compact, practical body of information that will indicate the range of technological possibilities, at the same time calling attention to technical, economic and social problems that have an important bearing on feasibility. Copies are available through the John Hopkins Press, Baltimore 18, Maryland.

★

Colonial Geology and Mineral Resources, vol. 6, No. 4, contains articles on the Superficial Deposits of the lower Shire Valley, Nyasaland, by Alex. Muir and I. Stephen; the Ijolites at Songo, Sierra Leone, by C. O. Baker, Vladi Marmo, and M. K. Wells; the Occurrence of a High Grade Beryl Ore in Hong Kong, by B. P. Ruxton; and Graphite Seams in Hong Kong, by B. P. Ruxton.

BICC

GROUP SALES £129M.

The 12th Annual General Meeting of British Insulated Callender's Cables Limited will be held on June 25 in London.

The following is an extract from the circulated Statement of the Chairman and Managing Director, **Mr. W. H. McFadzean, C.A., Companion I.E.E.**

Profit on Trading at £9,322,544 shows a decrease of £2,530,308, but some £560,000 of this is due to the inclusion in the 1955 figures of the Trading Profit of the Indian Cable Company which ceased to be a subsidiary in 1956. On a strictly comparable basis Profit on Trading for 1956 is thus some £2,000,000 less than 1955 which was a year of exceptionally favourable trading conditions we did not anticipate would be repeated in 1956.

The main reasons for the fall in Profit have been our inability to recover in full the substantial increases we have had to bear in salaries, wages, transport, fuel and many other costs and the intensified competition being experienced both at home and abroad. These adverse factors have to some degree been offset by the benefits being obtained from recent capital expenditure and by an increase in sales but, on balance, profit rates are appreciably lower. Competition is a challenge always to be met, but the trend in 1956 for costs to increase at a greater rate than productivity is one that must be reversed soon in the interests of this country as a whole.

It is proposed to pay a Final Dividend of 8½% making, with the Interim Dividend already paid of 4% a total distribution for 1956 of 12½% (all less income tax).

The Balance Sheet is a strong one with assets shown at very conservative figures and Reserves now totalling over £29,000,000.

Sales

Sales of the BICC Group to outside customers amounted to £129,000,000, a new record and an increase of some £10,000,000 or 8.3% over 1955. The increase in volume of goods produced was even greater, for generally speaking lower selling prices applied during the year and the average price per ton of our principal raw material, copper, was also less than in 1955.

The two principal factors influencing sales in 1956 were the violent changes in the price of copper, and the impact of credit restrictions.

Having regard to the extremely disturbed conditions which have applied lately in this country and elsewhere, it is difficult to express definite views on 1957 prospects. All I feel I can say is that in total our orders received are up to our figures for the corresponding period last year : that the immediate trend of demand for some of our products is still uncertain; and that competition remains extremely keen.

From the longer term aspect I have every confidence.

GOLD FIELDS AUSTRALIAN DEVELOPMENT

The Twenty-Fourth Annual General Meeting of Gold Fields Australian Development Co. Ltd. was held on May 30 in London.

Mr. R. H. A. Neuschild, the Chairman, in the course of his speech said :—

An amount of 2/- per share was repaid to the shareholders on July 17, 1956. To make this payment, involving an amount of £200,000, we had to draw slightly on resources originating after December 31, 1955, with the result that although the increase in the group net assets during 1956 amounted to £80,828, the figure in respect of net cash assets at December 31, 1956, stood at £74,949. On April 15, 1957, this item had increased to £90,734.

The profit from mining operations and sundry revenue for the year was £70,562.

Since March 19, 1956, only actual expenditure on development has been charged to working costs.

In the main, with 34,448 tons milled for a production of 16,611 ounces of gold, operations followed the results for 1955. The ore reserves at December 31, 1956, were estimated at 74,000 short tons averaging 8.78 dwt. gold per ton representing approximately two further years' operations.

Last year I expressed the hope that we may, in due course, be able to return possibly a further 2/- per share. That forecast can, I think, stand, and as soon as we accumulate sufficient funds to justify an application to the Court, a further return of capital will be made.

The report and accounts were adopted.

Mine Returns

WEST AFRICAN GOLD

Company	3 mths. to March 31, 1957 Tons (000)	Yield (oz.)	Profit (£000)	Months since year end	Current Financial Year Total to date Tons (000)	Yield (oz.)	Profit (£000)	Last Financial Year Total to date† Tons (000)	Yield (oz.)	Profit (£000)
Amal. Banket	174·3	34,402	63·8	6	350·6	71,228	157·3	216·0	31,349	L24·1
Ariston	116·8	34,813	129·2	6	235·9	69,545	267·8	101·6	27,412	90·0
Ashanti	82·5	71,000	545·7	6	164·9	133,309	988·8	60·5	55,001	35·8
Bibiani(1927)	90·0	19,500	81·3	6	180·0	39,000	162·2	79·0	16,725	L77·6
Bremang*	1860·2	10,251	36·2	3	1860·2	10,251	36·2	1050·9	5,680	10·8
Ghana M.R.	34·3	11,839	37·3	9	106·7	33,958	101·0	52·3	15,390	40·1
Korongo	14·8	11,838	47·8	6	28·5	23,723	97·8	9·4	8,518	32·5

Note.—Profit figures include Ghana Government grant. * Cu. yd. dredged.
† Last year's figures affected by strike beginning Nov. 20, 1955.
L indicates a loss.

COAL OUTPUT

Company	3 mths. to March 31 (in tons)	Months since Year End	Cumulative Totals (in tons) This year to date	Last year to date
Amal. Coll. of S.A.	1,546,565	3	1,546,565	1,610,513
Apex	228,091	3	228,091	230,923
Blesbok	152,988	3	152,988	153,529
Coronation	294,741	3	294,741	239,636
Natal Navigation	251,030	9	807,166	885,409
New Clydesdale	250,098	9	726,254	717,922
New Largo	297,688	3	297,688	321,826
S.A. Coal Est.	426,263	9	1,248,468	1,262,208
Springbok	217,012	3	217,012	214,294
Transvaal & Delagoa	344,821	7	815,079	850,706
Van Dyks Drift	172,189	3	172,189	173,337
Vierfontein	345,344	3	345,344	369,199
Vryheid Cor.	157,405	3	157,405	156,928
Vryheid Cor.*	122,397	3	122,397	124,270
Wankie Coll.	972,463	7	2,243,596	2,127,047
Wankie Coll.*	61,111	7	145,018	129,051
Witbank	429,438	3	429,438	440,071

* Coke.

TIN OUTPUT IN TONS OF TIN CONCENTRATES

Company	3 mths. to Mar. 31	Months since year end	Financial Year to Date This	Last	Company	3 mths. to Mar. 31	Months since year end	Financial Year to Date This	Last
EASTERN									
Ampat	a259½	3	259½	390½	Tambah	j21½	3	21½	44½
Ayer Hitam	175½	9	376¼	524½	Tanjong	357½	3	357½	364½
Berjuntai	298½	11	696	723½	Tekka	42½	12	143½	138½
Chenderiang	43	12	182½	220	Tongkah H.	200	9	615	563½
Gopeng Cons.	219	6	464½	407	Tronoh	736	3	736	711½
Hongkong Tin	62½	6	176½	233½					
Ipoh Tin	53	12	265	286	**NIGERIA**				
Kampong L.	191½	12	769½	b131½	Amal. Tin	1236	12	4168	4435
Kamunting	611½	12	2354½	1845	Amal. Tin†	136	12	555	573
Kent (F.M.S.)	56½	3	56½	52½	Bisichi	201	3	201	210
Kepong D.	98½	9	273½	237	Bisichi†	59½	3	59½	90½
Killinghall	43½	6	113	155½	Ex Lands	188	3	188	171
Kinta K.	72½	12	279½	227½	Gold & Base	244	3	244	156
Kinta Tin	196½	3	196½	87½	Gold & Base†	23	3	23	41
Kramat Tin	129	12	459	365½	Jantar	56	6	111	122
Kuala Kampar	363½	12	2045	1993½	Jantar†	57	6	116	112
Kuchai	c62	6	137½	275½	Kaduna P.	16½	3	16½	12½
Larut Tin	96½	3	96½	282½	Kaduna S.	90½	3	90½	118
Lower Perak	550½	12	1656½	2263½	Keffi	18	12	61	0
Malayan Tin	435½	9	1664	2102½	Keffi†	0	12	201	365
Malaysiam	29½	12	110	155	London Nigerian	62½	12	300	280
Pengkalen	120½	6	240	308½	L. Nigerian†	0	12	1½	¼
Petaling	d349½	5	e584½	—	Naraguta Ex.	51½	3	51½	56½
Puket Tin	150½	3	150½	164½	Naraguta K.	26½	3	26½	38½
Rahman H.	97	9	245½	281½	Naraguta Tin	82½	3	82½	38½
Rambutan	44½	9	131½	165½	Naraguta Tin†	25½	3	25½	19½
Rantau	218½	9	685½	419½	Ribon	72	12	222	213
Rawang Tin	f34	12	f689½	1213½	Ribon†	0	12	20½	28
Renong	192½	9	537½	566½	Tinfields of Nig.	22½	12	39½	29½
Selayang	60	6	122	113	Tinfields of Nig.†	0	12	0	12½
S. Kinta	1079½	12	3981½	3434½	U. Tin	16½	9	62½	88½
S. Malayan	641½	6	1294	1454½	U. Tin†	2	9	29	56½
Siamese Tin	g732½	3	732½	893	**MISC.**				
S. Tronoh	211½	3	211½	184½	Beralt Tin	33	12	169	213
Sungei Besi	h256½	12	1230½	1189½	Beralt Tin‡	615	12	2301	1997
Sungei Kinta	97½	3	97½	94½	Geevor Tin	189	12	697	655
Sungei Way	i378½	9	1015½	1060	S. Crofty Tin	190½	3	190½	186½
Taiping	131½	3	131½	188½	S. Crofty Tin‡	0	3	0	4½

† Columbite ‡ Wolfram
a Dredge closed Feb. 6 to Feb. 27 for replacements.
b Two months only.
c Dredge closed down March 13 having exhausted all available payable ground.
d No. 4 Dredge closed down Feb. 15 for installation of conveyor equipment; No. 5 Dredge docked on March 25.
e Figure relates to 6 months from Oct. 1.
f To Jan. 15 only; thereafter included in Berjuntai output.
g Kota Bahru Dredge closed down March 9 for electrification.
h Pelepah Dredge closed Feb. 2 to Feb. 21 for repairs.
i Dredge closed down March 18 for installation of stripping chute.
j Dredge closed down Feb. 21 on exhausting its ore reserves.